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OPERATIVE DISPOSAL OF CHRONIC SUPPURATION OF THE EAR.

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After a brief period of unusual enthusiasm during the last twenty years of the past century when the majority of otologists preferred surgical treatment to the conservative one in suppurations of the middle ear, there is now great silence on this subject in otological literature. We owe to the above period not only important improvements in operative technic in surgery of the middle ear and tympanum, but we also owe to it numerous contributions in pathological anatomy and physiology on the functional sequelae of operations upon the aural apparatus. All this great work has without doubt meant progress in the surgery of diseases of the ear and has accomplished better results than the more or less older conservative methods. Even these results have been eclipsed by the further progress of ear-surgery in complications of acute and chronic suppurative conditions.

For example, it is not rare to find that in a case of purulent chronic otitis media in which some years ago the endo-method would have been used, the external method is now resorted to without further ado.

I propose to examine the suppurative chronic lesions pertaining to the tympanic cavity. We know that surgical intervention through the auditory canal in chronic suppuration of the tympanic cavity

and its adjoining regions cannot go beyond certain limits due to the fact that the diseased parts are beyond reach of the otoscopic examination and consequently beyond reach of the instruments introduced in the external auditory canal. The task of the operator is easy enough if the lesions are localized in the tympanic cavity, but it becomes more difficult in affections of the attic where more or less diffuse necrosis may be suspected. In such cases most operators invade the mastoid antrum and later demolish the external wall of the auditory canal to thus reach the tympanum.

Naturally, since the lesion is confined to the middle ear or attic, the question arises whether it is not a false procedure to attack healthy areas in order to reach the diseased ones where possible injury or complications may accidentally result, such as facial paralysis, lesions of the semi-circular canals, contact with the abnormally located sinus.

The persistence of middle-ear suppuration even after endo-tympanic intervention is due less to unsuccessful operation than to stricture of the bone, which doubtless has a peculiar influence on the evolution of the auricular suppuration. Besides bearing in mind the variations in the normal tympanic cavity and mastoid, we must consider three fundamental variations in structure of the cavity,—diploic, pneumatic and sclerotic.

Sections made of lesions of the middle ear, either in children or in adults, easily explain the persistence of the suppuration because of the spongy character of the tympanic walls, namely, that type which Cheatle has called infantile. Now remembering that in the formation of the mastoid and tympanic cavity, the petrous portion, the squama and the tympanic ring meet and that the petrous bone predominates, we can explain the frequent presence of spongification in the posterior wall of the tympanum and in the posterior portion of the epi-tympanum, because the squamous mastoid wing contains less diploe than any other cranial bones; at its articulation with the petrosa it consists of only a thin cortex.

The separation between petrosa and squama is sometimes permanent at the squamo-petrosal suture. In these cases there is a lamina discribed by Schwartze-Eysell, while in the cavum tympanum there is a crest along the epi-tympanum, described by Rouviere and Canepele.

In the pneumatic structure type the pneumatization is sometimes noticeable in the squama. This has been proved by the fact that even in the seventh month of foetal life, one can find in such cases epi-tympanic cells, especially in the external wall of the attic.

However when the endo- and eso-cranial corticle is very thin, we note that the surface of the bone, be it in correspondence with the tegmen tympani or the tympanic ring alone, will assume the appearance of riddled tissue or at least it will be so thin as to be transparent and easy vulnerable. For this reason in some adults the pus travels upward as it does in the case of children and we understand why chronic suppufation of the ear in such cases of excessive pneumatization would not be cured by endo-tympanic surgical intervention.

The evolution of purulent otitis may also be influenced by the compact structure or sclerotic character of the temporal bone if the eburnization is not caused by osteo-sclerosis determined by otorrhea,and therefore it checks the extension of the process and is rather an anatomical condition. It is certain that even when chronic suppuration of the attic and antrum is limited to the mucosa, if there exist a complete physiological eburnization, the results of exenterating the tympanic cavity are not always favorable, because the cavity as well as the antrum are smaller than normal and in their topography they are atypical and dependent, according to my personal opinion which conflicts with that of Moure.

This does not develop from a process of normal ossification but rather from a deviation in the developmental growth of the middle ear. The numerous differences in opinion regarding the fetal and post-fetal origin of the antrum are thus explained. The attic-aural cavity does not belong to the category of fixed and essential organs appearing at a fixed embryonic time like the internal ear, the eye, the heart, etc. The middle ear is an accessory organ without a fixed period of formation and as such it must depend upon the essential organs and will undergo all the changes depending upon special conditions inherent in the individual but not in the species. This causes a precocious, retarded or even arrested development determined by hereditary conditions.

It is in the period of development that the tympanic cavity as an accessory organ will be closely bound to the normal or pathological process of the temporal bone and can therefore in the same manner be of pneumatic or diploic structure undergoing arrested development caused by untimely eburnization, perhaps due to a progressive bony lesion of rachitic or osteo-malaceous origin.

There has been but little importance attached to abnormal bony formation in the etiologic development of the temporal bone, for which reason the normal anatomy of the middle ear and accessory cavities cannot be systematically described.

Even orientation in non-pathological processes of the bone determines conditions of morbid processes, varying in individuals. The varying tendency of the pars squamosa to unite with the pars petrosa brings about the fact that the epi-tympanic cavity is above the head and neck of the incus and varies in size; therefore in some adults the superior border of the ossicles almost touches the roof of the attic as in children, while normally a space of variable size should exist.

Recent anatomical study shows that the epi-tympanic cavity tends physiologically to increase in size. Occasionally there is arrested development which seems to involve aditus ad antrum. Normally the antral cavity, already completely developed at birth, does not increase. Sometimes the antrum increases in vertical dimension to a diameter of two centimeters. Supposing, then, that normally the highest point of the antral cavity corresponds to a horizontal plane passing through the suprameatal spine, we find that the floor of the antrum is much lower than the aditus and epi-tympanum from which it originates. In the completely developed fetus, therefore, the floor of the antrum corresponds nearly to the plane of the attic.

In course of time the antrum may undergo an arrested development and a horizontal line drawn on a level with the inferior border of the epi-tympanum, namely at the postero-superior angle of the external auditory canal, would then pass either along the floor of the antrum or below it.

We must consider another important, anatomical factor, namely, that the outside wall of the attic analogous to that of the antrum, is formed by the squamous portion of the temporal bone, which may descend so low as to notably reduce the tympanic portion of the cavity and to render the epi-tympanum less accessible. Perhaps this takes place in those cases in which the inferior border of the antrum is above the petro-squamous suture. We are also interested at this point in the bony pneumatization of the external wall of the attic in which small cells have been noticed since the seventh month of gestation.

Greater or lesser development of the epi-tympanum may be favorable or not favorable to endo-tympanic surgery and in cases in which the attic remains small and the cavity antero-posteriorly restricted it may be difficult or even impossible to reach the incus.

Excepting in cases of chronic otorrhea involving the labyrinth, an advance has been made in cases of limited lesions of the aditus ad antrum by emptying the petro-mastoid process, by which the patient

is not only spared all possible complications of a chronic suppurative process of the ear but the hearing is thereby saved. Opinions differ regarding the results of this surgical procedure; some claim that the remnant of hearing is not modified, others that it is improved, and others again maintain that it grows worse.

Some years ago Scheibe advised leaving the ossicles intact in the radical operation. Panse and Jansen, shortly after the radical operation become popular, also advised sparing the ossicles. Stacke himself recommended not touching them in certain cases, and later Siebenmann was of the same opinion.

This conservative idea regarding an operation of such destructive character upset the partisans of endo-tympanic surgery.

It was stated that when the lesion is limited to the aditus ad antrum, while hearing is maintained due to air-conduction, and the Gelle test is positive, the acoustic power may be lessened by removing the ossicles, which fact is of great importance if there is any deafness in the other ear.

We must not confound those chronic suppurations having their seat in the antrum with those localized in the tympanic cavity and epi-tympanum. In the first case, the acoustic function being less involved, it is advisable to retain the ossicles; in the second place it is absurd to hope to obliterate the suppuration by keeping the ossicles which are always affected.

I have made numerous histological examinations of ossicles and we owe it to our science to report the results. Eleven cases were examined, in seven of which only the malleus was examined, in two others only the incus, and in two the incus and the malleus.

The ossicles, after removal, were at once immersed in a solution contining 5 per cent formalin and 4 per cent nitric acid. I have successfully used this solution in many experiments on the entire labyrinth of various animals and of man. The complete decalcification required one month or more, depending upon the permeability of the ossicles. After the decalcification, the specimen was washed for twenty-four hours in running water; then stained in bulk with carmine and some with hemotoxilin-eosin when the first staining proved unsatisfactory.

Fluoroglucin was not used for decalcifying because, while it is excellent for normal bone, it is not equally good for diseased bone. After staining, the ossicles were embedded in paraffin to obtain thin sections.

In general it was observed that staining was rarely complete and that even restraining with hematoxylin was not entirely successful. This I attribute to the advanced necrosis of the examined tissues.

Having admitted this, we note that in scarcely any ossicles was it possible to observe the normal structure of the bone and that in slight as well as in marked alterations there was a gradual succession of nearly all phases of atrophy, rarefaction, destruction and necroses of the bony substance, except in one case of tubercular process of the malleus which consisted of voluminous granulation of giant cells situated at the head of the bone and larger than it.

Among the slight alterations we noted a wedged-like appearance of the bony structure, as if the section were made of different pieces glued one on top of the other. This appearance evidenced by the unevenness of the staining of the section, is due to the fact that the plates of one bony trabecula run in an oblique or perpendicular direction to those of the adjacent plate. As we know this appearance is due to prior re-ossification occurring at various times. (Morpurgo.)

Often blood-vessels even in bones not yet necrosed present occlusions. These can be distinguished clearly from normal vessels in which the normal elements of the blood occupy the entire lumen. We have often noticed rather large zones of rarefication in the head of the malleus, or along the handle or in the center of the incus. This rarefication proceeds from the medullary spaces or from the connective sheaths within the small Haversian channels; the medullary substance was reduced to a stroma of wide meshes and no contents; the connective tissue was atrophied and reduced to very light stroma with few cellular elements.

The outlines of the ossicles in this first stage of alteration were not regular but contained frequent fossae and the periosteum of these fossae was either slightly proliferated or retracted, thin and atrophic.

Among the more serious changes we noted were accentuated rarefaction confined not to a limited area but to the entire ossicles, in which trabeculae were detached from one another. Only some of them presented traces of lamellar structure or of visible bony corpuscles.

Often in the midst of this great lamellar detritis the opening of some residual blood-vessels with indefinite walls could be discerned, because they were without staining-fluid and the lumen was entirely occluded by amorphous matter of coagulated blood

remaining like caput mortuum, but without presenting the various aspects of thrombosed organization.

We incidentally observe that in the middle ear in general and in the chain of ossicles especially, the process of organization and retrogression is developed more slowly and it is often arrested at an intermediate stage which is followed by a process of mumification—according to our opinion this is due to the above-mentioned occlusion of the vessels, not by an ordinary thrombosis but by a coagulation in which one can distinguish only the hematoid appearance and not the hemosiderin which, as we know, is produced by oxygen which probably in the cases examined was lacking. It is reasonable to assume that the arrest of circulation determined in this manner was the first cause of malnutrition and later on of the necrosis.

In a more advanced stage when no staining of the sections resulted, we observed an *ensemble* of detached pieces which, while they had the form of the ossicle, presented no other structure, resulting from the amorphous substance uniformly but incompletely stained by the protracted staining with hematoxylin. In his large detritus some shape of the Haversian canal can be recognized with remains of the vessel running through it. The scaly structure had entirely disappeared and no trace of bony corpuscles was to be seen.

The changes described at different stages of the malleus and incus, were found in nine of the eleven cases examined. In one of these only we noted a process of bony reconstruction during the active stage, hardly noticeable in the malleus, but pronounced in the incus; in another affected by tuberculosis, the process of re-ossification of the malleus was scarcely noticeable.

In the first of these two cases the malleus showed the presence of osteoclasts toward the margin in a row in front of osteoid tissue. On the other hand the incus showed between the proliferated periosteum and the underlying bone a hematic vessel, like a thin stripe which at one point descended into a relatively large bony fossa in which by clear illumination the various phases of thrombosed organization were visible. To correspond with the thin, fine line of blood-flow, the bone in contact with it was strongly colored and rich in osteoblasts; on the walls of the fossa were many osteophites lined up like elevations from the bone and penetrating the hematic thrombus. This reproduction of bony tissue in immediate contact with bloody effusion under the periosteum or in the thrombus, described above, is evidence, according to our opinion, of a special

process of reintegration of diseased bone and deserves further investigation.

One of the eleven cases, at the time the process was discovered, proved an exception to the rule of gradual de-nutrition, atrophy and necrosis of the ossicles; very probably it was only a transitory stage of the disease. Like cases of atrophy and necrosis of ossicles which showed prior re-ossification, it may be assumed in this case that re-integration was not definite but could be followed by a retrogressive change.

We shall now discuss the case of tubercular malleus, having a very large tubercular granuloma which is double the size of the head and protrudes from the bone, like a connective fibrous growth, which swells to form a fleshy button in whose center there are fibrous crypts surrounded by giant cells and other nests of giant cells surrounded by connective tissue. At the periphery, this granuloma presents a large infiltration of decaying cellular elements with nucleus.

Even in this case the osseous substance of the underlying malleus resembles the normal structure according to the arrangement of the trabecula, of the layers and osseous corpuscles. We note two changes of which one consists of the slight coloration of the corpuscles, which, open, appear to be empty; the other of the rarefaction of the trabeculae by penetration of the generative connective tissue.

This generative connective tissue has only in limited degree the well known character of connective osseous tissue, because of few osteoblasts in the confines of the osseous substance, and all the osseous substance of the malleus is affected by mal-nutrition and atrophy leading to necrosis. Even by admitting a gradual substitution of new for diseased bone, we must notice that the bony connective emanates directly from the tubercular granuloma and therefore undergoes the same tubercular process.

We must conclude, therefore, that from the anatomo-pathological point of view any inflammatory process directly involving the ossicles ends eventually in necrosis even though the process temporarily subsides.

All authors who have retained the chain of ossicles in the radical operation agree that the following is necessary to obtain the best acoustic results: 1. That the continuity of the chain should be maintained. 2. That the membrana tympanum should be preserved as much as possible because of its tendency to re-form and to replace even the chain when it adheres to the stapes. 3. That a

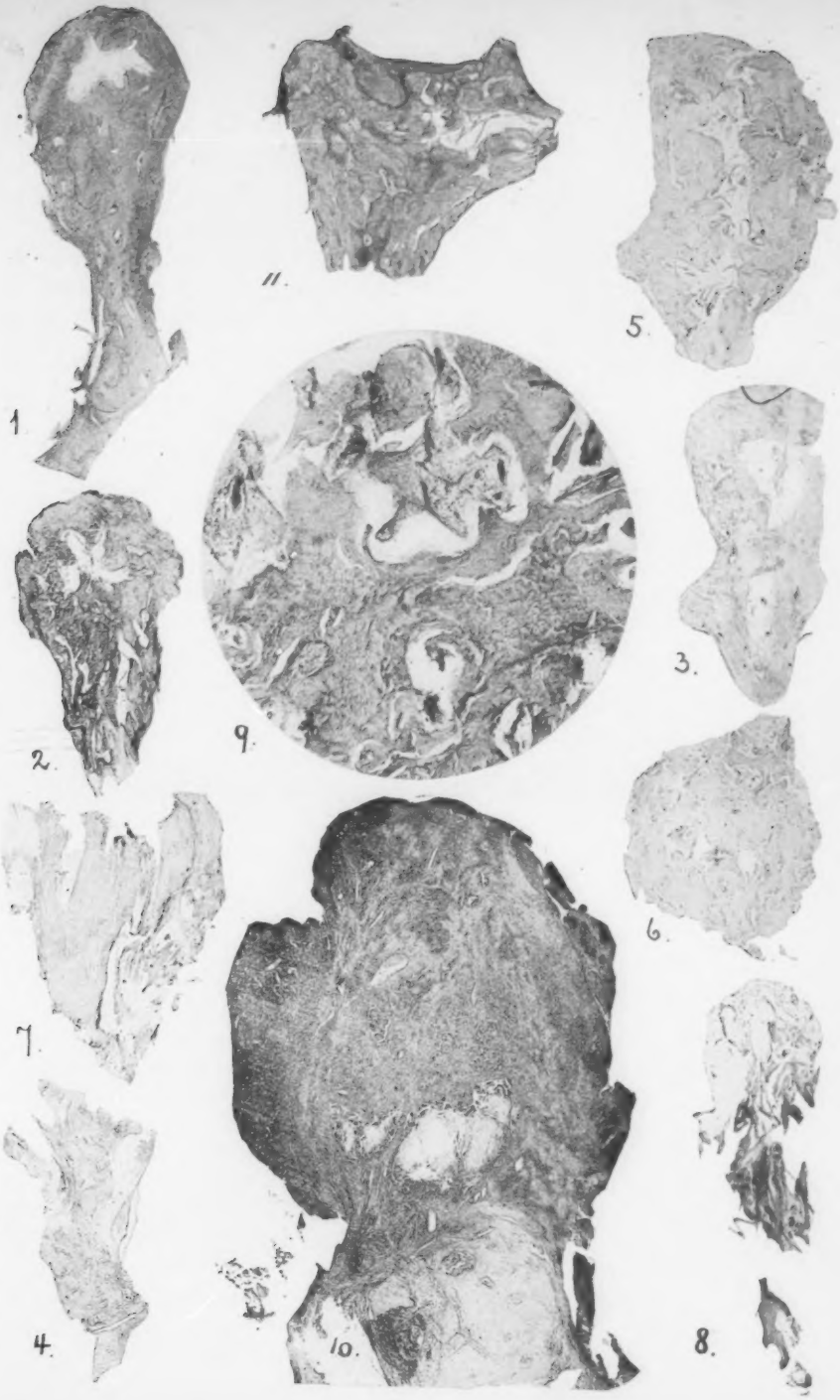

PLATE TO ILLUSTRATE ARTICLE
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part of the tympanic ring, and a part of the external attic wall should be preserved as a point of support and source of nutrition for the membrane. (Heath, Bondy, Schwenemann, Botey, Mahu.)

Stacke believes in the success of the radical operation by retaining the ossicles in those cases in which the cavity is not affected, where there is cholesteatoma of the attic, the antrum and aditus. He proves this by passing a catheter through the tube through which the air-current cannot reach the attic. Stacke believes on the whole that by epidermization of the attic, aditus and antrum, if the cavity and membrana are intact, one can avoid tubal re-infection and 50 per cent of cases can be cured. (Bondy, Barany, Urbantschitsch and others.)

Stacke in such operations was able to conserve normal hearing, or nearly so. He, therefore, favored the more radical procedure in cases where one ear was affected by cholesteatoma and the hearing good even if the sense of sound was lost in the other ear, providing the above-mentioned conditions were present.

Stacke does not report much improvement in hearing from this operation when the hearing was already impaired. Not having broken the chain, after attic-antral suppuration is overcome, Stacke is free to undertake ossiculectomy *via* the endo-tympanic route for acoustic results.

The point is whether in those relatively rare cases in which the cholesteatomatous lesion is limited to the antrum and the aditus, one could suppose the ossicles to be unimpaired, even when by otoscopic examination they seem to be sound and the hearing more or less satisfactory. I question Stacke's position in recommending a conservative intervention even when the chain is broken by a process along the incus; thus leaving the tympanic cavity closed by a residue of bone that is unquestionably diseased. Stacke's conservatism goes further; he advises retaining the malleus and the membrana, even if the incus has been expelled in the hope that the tympanum will re-form.

Our long experience in middle-ear surgery does not permit a too great enthusiasm for this conservative-radical method, which in attempting only to save the hearing, may, because of retention of suppurative foci produce a recurrence.

On the other hand the hearing after many classical, radical operations has improved or, at least, not grown worse. We recommend trying the micro-telephone in preference to the tuning-fork and other sounding apparatus. Having tested the hearing before and after operation for the spoken and whispered word, with this in-

strument, most cases after a certain time showed improvement and very rarely a decrease in sound-perception. I prefer this instrument to all other audiometers because it is a test for perception of the human voice which is most important in our relations. All other instruments fail in this respect because an ear which can perceive musical sounds may at times not hear the voice.

Just as the question of ossiculectomy was considered pro and con, so now the radical-conservative cure is disputed from the auditive point of view. Leaving aside the value of the mechanism of transmission to the labyrinth through the ossicles, that no matter which physiological theory one favors, all admit that the excenteratio cavi tympani produces positive improvement in acoustic perception each time the stapes is made mobile. It is true that in patients who long ago were operated for ossiculectomy in chronic suppuration and whose hearing was improved for voice perception, it could be shown that pressure on the stapes (indirectly by closing the canal or directly with the Lucae sound) resulted in diminution, or even loss of bone-perception for the tuning fork.

Aural surgery, like all other surgery, seems to have become too aggressive in recent years and loses sight of the fact that the radical operation is not always justifiable. Sometimes a lesser surgical intervention will also cure. The radical-conservative operation is not without inconvenience; the time for its cure is not shorter, and its functional results are not superior to those of endo-tympanic surgery. In all chronic suppurations the attic and aditus are not always affected and to sacrifice a sound bone is not justifiable. Long experience shows us that many cases of chronic otorrhea are permanently cured by ossiculectomy with or without destroying the external attic wall and we have noticed that hearing is either not impaired thereby or even improved.

The systematic anatomic pathologic study of the removed ossicles either by endo-tympanic or radical measures has proved that in chronic suppurations the elementary structure of the occicles is always affected even when under microscopic examination they seem to be normal.

We affirm that the classic radical operation is to be preferred to the so-called conservative radical. Although the former is always serious and laborious, it leaves in place ossicles that are of doubtful condition and because of the surgical intervention they are left with less resistance. We do not believe that this much-lauded surgery can replace the radical operation. It is not such an advance in conservative surgery as to be preferable to the more simple and less destructive endo-tympanic method.

The logical method would be to proceed from the endo-tympanic to the radical where the former has been unsuccessful, rather than to proceed inversely.

It were vain to discuss the real results attained by intra-tympanic surgery for chronic suppuration limited to the tympanic and epi-tympanic cavity which heretofore was not cured but often rendered worse by treatment. To Sexton and Ludwig are due the advance in the cure of chronic, purulent suppurative otitis. These authors have suggested as a radical method the removal of the membrana and ossicles since it is known that after suppuration had destroyed the foot of the stapes, a spontaneous cure sometimes takes place conserving sufficiently good hearing.

After the period of enthusiasm had passed, one must admit that clinical data were not always so favorable as was hoped for by intra-tympanic intervention. Even excluding errors in technic cures are not as numerous as was thought.

Failure is due, after excising membrana, ossicles, external attic walls, cicatricial adhesions and granulations, fungous growth of the epi-tympanum through the auditory canal, to the nature of the specific micro-organism causing the suppuration (tuberculosis, ozena, syphilis) and is sometimes due to special dyscrasia (rickets, osteomalacia, diabetes, gout, arterial sclerosis, etc.). Sometimes it is due to abnormal anatomical structure, or to a deficient functioning power of the Eustachian tube, originating in the principal respiratory organs. Some of these obstacles to cure can be recognized through the auditory canal before attempting to operate.

In cases of tuberculosis and ozena it will be well to recall in chronic otorrhea that we should resort to an ample opening of the antrum and aditus and epi-typanum and we should not limit ourselves to exenteration of the tympanic cavity alone.

In such cases diagnosis is relatively easy. History and examination in tuberculosis will show hereditary pre-disposition, or latent or active processes. Otoscopic examination will show an abundant purulent offensive and bloody discharge, without pain, and a vast destruction of bone, facial paralysis and great diminution in hearing. Another aid to diagnosis is the rapid destruction of the ossicles, the easy reproduction of fungous growth as soon as removed, and rapid caries which can be noted by local application of strips of gauze saturated in a solution of glycerine and dermatol. This becomes black because in the process of caries the dermatol (sub-gallate of bismuth) turns black on account of the development of sulphides.

If some of these clinical data are missing to establish tubercular otitis at first examination, and if bacteriologic examination of the pus is negative in the search for acid-resisting granules, we have other means to diagnose the lesion, namely tuberculin test (ophthalmologically and cutaneously). If there is still doubt as to the pathognomonic data, inoculation of the peritoneal lymphatics in the rabbit will give infallible proofs. (De Rossi.) Exenteration of the tympanic cavity is contra-indicated when the suppurative otitis can be traced directly to an ozenic process in the nose, and where the ozena bacillus can be demonstrated.

I have shown previously in typical cases of ozena with suppurative otitis media, that the pathological process is limited to the mucosa lining the tympanum and adjacent areas and does not invade the osseous walls of the cavity and the ossicles, except in long-standing cases. In these, like in the pathology of the turbinates, we may note in the ossicles a rarefaction of the peripheal lamellae with reabsorption of the osseous canaliculae.

Exenteration of the tympanic cavity rarely effects a cure for chronic otitis media when the ozena bacillus persists, and sometimes even the classic radical operation will not successfully cope with the situation unless the Eustachian tube is definitely obliterated.

It is much more difficult to foresee failures due to re-infection of the tube, if the suppurative process persists in spite of exenteration of the tympanic cavity via the canal, or if a relapse occurs even after epidermization.

In the first period of intra-tympanic surgery many unexplainable failures were due to the Eustachian tube, a physiological and pathological link of communication between the respiratory organs and middle ear, which at that time was unexplored. Frequently affections of the tube are not recognized until catheterization, when otoscopic examination reveals an excessive tympanic retraction due to tubal stenosis of naso-pharyngeal origin.

In two successive publications (1904-1908) I have discussed the necessity of definite obliteration of the Eustachian tube in auricular intervention for a radical cure of chronic purulent otitis media, especially when the suppuration has no connection with an anatomic anomaly of the temporal bone, including the intra-petrous portion of the tube but due to latero-pharyngeal lesions which prevent the physiological function of the tube.

Any change of the naso-pharyngeal cavity and of the lateral walls and palate, preventing movement of the elevator-palati, the dila-

tator tubae and tensor palati will close the pharyngeal opening of the tube which normally is always open in spite of some contrary opinion.

Transformed into a closed cavity the canal will augment the virulence of the micro-organisms, which, perchance, are there.

De Rossi, in examining bacteria of the tube of normal persons, found that the normal secretion contained no pathogenic micro-organisms. Therefore, it is evident that the microbes penetrate because of deficient mobility of the tube due to the naso-pharyngeal lesion. The opening of the tube is so necessary that Sohier Bryant claims that inflammations of the middle ear, except in cases of hematic origin, rarely cause mastoid or endo-cranial complications when the tube is open.

Knowing that the tube is divided into two sections, of which the bone forms the accessory vault and the fibro-cartilage a diverticulum of the pharynx, the infection of the naso-pharyngeal cavity will happen through the tube, and above all, through the upper bony part called by De Rossi, the safety space, which always is more or less open even in serious cases of infiltration of the mucous membrane. That this is true has been shown by the fact that also in long-standing otorrhea involving the tube, the liquid injected into the cavity reaches the throat sooner or later.

On this assumption during the pre-operative period I base my treatment consisting of introducing through the cavity strong liquid caustic, with head of patient inclined away from the affected ear; to prevent the flow of liquid into the pharynx I use a catheter with closed end, and tightly close the pharyngeal orifice of the tube.

Since 1904, having based my procedure on these anatomic-physiologic theories and having checked a repetition of otorrhea which is not due to direct lesion of the middle ear and accessory cavities, but to septic matter flowing there from the tube while in the reclining position, I thought best to try the operative method of Segura.

I desisted from this because of the practical difficulty of introducing an electric platinum snare into the tube and because of the acute pain and reflexes resulting and because of the acute suppuration of the ear and accessory cavities which could arise later. I deemed it wiser to cut off the passage from the tympanic cavity to the naso-pharyngeal vault, obstructing by gavano-cautery the tympanic orifice of the tube.

In 1909, I repeated the assertion that it was better to close this tympanic orifice, based on the same anatomic-pathologic principles

which showed evidently that the osseous portion of the tube is more involved in the early affections of the cavity while the fibro-cartilaginous portion is more apt to be affected by lesions of the naso-pharyngeal cavity.

We do not admit that in spite of the closing of the tympanic orifice of the tube infection could invade the cavity through submucous tissues being arrested by the isthmus. Infection could also reach the middle ear by the lymphatic circulation, which, however. is poor in the fibro-cartilaginous portion of the tube. This is of greatest value in preparing to close the tympanic orifice rather than the pharyngeal opening.

I was surprised to see in the reports of the German Otologieal Society which met at Hanover in May, 1912, a communication of Larowitsch, of Jena, in which among many other means of closing the tympanic orifice of the tube plastically, there is no mention of my method. Urbantschitsch, at this meeting, recalled a method proposed by his son, consisting of the introduction of a probe saturated with a solution of nitrate of silver with which the tubal walls are energetically rubbed. In this way he believes tubal suppuration can be cured without a real closure of the Eustachian tube, which he thinks would impair hearing.

The following conclusions indicate when operation by means of the canal is justifiable: (a) In recurring chronic suppurations, when we are convinced that the reaction depends upon retention of pus in the attic. (b) When persistent suppuration of the cavity is not due to tuberculosis or ozena. Removal of the ossicles may result in drainage of possible suppurations in the antrum. (c) When definite caries of the ossicles or the external wall of the attic is determined In chronic otorrhea not due to bony lesions but localized in the soft tissues (chronic purulent otitis media, adenoids, deficient or improper perforation of the membrane and tubal stenosis). (d) In all cicatrized lesions following previous suppurations which have caused functional disturbance by retraction, which fact can also be proved by existing suppuration. (e) In all cases in which it is possible to exclude deep bony lesions of the mastoid, and having freed the cavity from physiological impediments, the tissues may be modified by therapeutics. (Radium and its derivatives.)

I shall not dwell on technic, which is simple and is just as it was taught by the first teachers of intra-tympanic surgery. I insist on the necessity of closing the tympanic ostium which I have described. I also advised the use of a back-cutting chisel which I have used since 1908, in removing the back attic wall. I think this

instrument is preferable to the biting forceps, as it makes a cleaner cut and avoids injuring the internal wall of the cavity.

According to some authorities, the use of the forceps produces remote bony lesions because of closing the Haversian canals affecting the nutrition of the adjacent bony tissues.

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LEGENDS TO PLATE.

Figure 1. Malleus with slight changes. Medullary cavity. All vessels occluded. Irregular borders of the ossicles.

Figure 2. Malleus of irregular form with altered periosteum and osseous substance of wedge-like appearance.

Figure 3. Malleus with non-uniform staining of section, with medullary tissue much rarefied.

Figure 4. Malleus with more advanced changes. Osseous tissue scarcely stained in sections, with osseous corpuscles hardly visible.

Figure 5. Necrosed incus.

Figure 6. Incus, trabeculae and osseous corpuscles hardly visible.

Figure 7. Malleus with necrosed osseus residue, partially formed of fibrous tissue.

Figure 8. Malleus formed of group of necrosed particles without structure.

Figure 9. Wedge-like appearance of a greatly enlarged incus. The osseous corpuscles are no longer visible.

Figure 10. Tubercular granuloma with giant cells surmounting the malleus.

Figure 11. Incus with subperiosteal hematoma and process of re-ossification.

PATHOLOGICAL CONDITIONS IN THE EAR, NOSE OR THROAT REFLEX TO DISEASE OF THE TEETH, JAWS OR PAROTID GLAND.

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Accumulating experience has forced upon the writer the conviction that an important chapter of oto-rhino-pharyngology is being neglected in examination and investigation of cases, in discussion of cases, and in medical treatises and papers dealing with otolargngology. This chapter relates to aural, nasal and pharyngeal disturbances due to lesions of the teeth in particular, and of the jaws or the parotid gland.

The subject of the relation of diseases of the eye to those of the teeth has received and is constantly receiving attention and treatment in medical literature. The same cannot be said of the subject of the teeth as a cause of pathological conditions in the ear, nose and throat. Now that we have the aid of roentgenography in diagnosis this subject can be given scientific rather than guesswork treatment.

This subject has had extreme interest for the writer for several years; hence it was a gratification to him to find a brief chapter devoted to it in Kerrison's "Diseases of the ear" recently published. Thorough search will disclose that something has been written upon this subject from time to time; but if it were receiving the attention that its importance rightfully demands, more attention would be devoted to it in the text-books and monographs which are constantly being published.

So decidedly has this relation between effect in the ear, nose and throat, and cause in the mouth been impressed upon the writer that he has come to doubt whether there be any such condition as, for instance, what could be denominated correctly idiopathic furunculosis of the external auditory canal. Such condition might well be due to infection of follicles by pus flowing from the middle ear, perhaps to diabetic toxemia, but the writer believes that careful search will show a furunculosis or edema, or induration of the soft parts of the external auditory canal, apparently idiopathic, to have origin in a reflex over the trifacial nerve.

These reflex changes are partly vasomotor, partly nutritional. The nerve irritation results in either a failure of nutrition with

local necrosis, due to spasm of arterioles, or later a vasomotor paresis with edema and passive congestion,—pseudo-inflammation.

The edema is frequently totally removed temporarily by a hot ear-douche, showing that the condition present is simply one of stasis, passive congestion, which is made to disappear by causing constriction of the local blood vessels. This leaves the skin looking normal; and the hearing is improved in those cases which had

Case 3. Miss J. B. H.

complained of dullness of hearing from the suffy condition of the external canal.

The above remark applies equally well to many a case of unrelieved tinnitus (especially that of a pulsating character), eczema or dermatitis of the external auditory canal with intense pruritus, as well as otalgia. It applies also to some cases coming for treatment of throat pain, enlarged, painful and tender submaxillary gland, even cases of suspected frontal sinusitis or antral abscess.

How vast a number of cases, for example, in which pus flows through the external auditory canal for years never develop a furunculosis, dermatitis, eczema or even a boggy condition of the skin therein! One can easily imagine the existence of a series of cases in which this flow of pus, coupled with a reflex irritation which is interfering with the nutrition of and lowering the resistance of the part would result in a furunculosis, brawny induration, eczema or dermatitis of the canal. But more than this, the writer has seen a series of cases in which there was bogginess, or brawny induration, or furunculosis of the canal, with itching or pain, or both, coupled with a scaly condition of the epidermis, with tympanic membrane intact, not due to flow of pus or any pathological condition of the middle ear, but found to be due to reflexes from the teeth or jaws over the trifacial nerve.

There are other obscure cases of discomfort or pain in the ear, or simulating otitis media, as far as subjective symptoms and complaint are concerned, or atypical tinnitus not presenting any pathological manifestations located in the tympanum, which also are due to the same cause.

Other cases show symptoms or pathological conditions in the throat which are also found to have the same origin. The throat cases are characterized by pain in the region of the tonsil (patients will report having just passed through an attack of tonsillitis), or tenderness and swelling of the left submaxillary gland, or trismus. One patient reported a marked swelling of the left submaxillary gland after the mastication of each meal. Still another class of cases present some or all of the ear or throat symptoms when the parotid gland is involved, as a late sequel of infectious parotiditis. These symptoms come on sometime after the initial attack of mumps.

Any search which available leisure has enabled the writer to make has failed to disclose any treatment of this subject in medical literature later than 1903, with the exception of some remarks made by Loeb, of St. Louis, at the meeting of the American Medical Association this year, to be quoted below. In 1795 Richter wrote regarding the connection between dental irritation and affections of the eye and ear.

The removal of impacted teeth and the relief of other pathological conditions in the mouth have resulted in the cure of deafness and other anomalies of the hearing-apparatus, according to the reports of dental surgeons. That otalgia may be due to disease of the teeth or to impaction of wisdom buds is common knowledge.

McCurdy, in his "Oral surgery," writes of deafness which at first appeared to be dependent on a grave lesion of the brain, as permanently clearing up after a correction of defects in the teeth. McCurdy writes as a stomatologist, having been chairman of the Section on Stomatology of the American Medical Association 1910-1912.

Speaking of the eruption of the third molar, or wisdom tooth, McCurdy says: "Some most troublesome complications may be as-

Case 4. G. W.

sociated with the eruption of the molar teeth. This is especially true of the third molar, since *in 50 per cent of the cases there is scant room for the tooth to erupt,* and its course through the alveolus is at variance with the normal, making pressure upon important nerves and resulting in ankylosis of the mandible." This testimony from one who is surely a competent oral surgeon shows in what a large percentage of cases there is trouble from the eruption of the wisdom teeth. Such being the case, and having shown that

the eruption of these teeth causes disturbance in those organs which interest us as oto-laryngologists, the necessity of bearing this relationship in mind becomes evident.

Joseph G. Turner, F. R. C. S., writing in the *Practitioner*, London, January, 1910, on "General or remote infection of pyorrhea (oral sepsis)," says: 'One infected tooth may be too much for some people, and, in fact, sometimes is, while a mouthful may not hurt others." He lists as resulting from diseased teeth: corneal ulceration, cyclitis, keratitis punctata, secondary cataract. Note that he makes no mention of conditions in ear, nose or throat.

Garretson, quoted by Reber, Philadelphia, in *Ophthalmology*, October, 1904, says: "A diseased tooth may express itself in almost any part of the body." Geo. W. Wright, D. M. D., of Boston, writes in the *Boston Medical and Surgical Journal*, December 5, 1912, on "The teeth and their relation to the body," giving attention especially to tonsillar infection from the teeth. Frank Allport of Chicago, has written on "The relationship existing between ophthalmology and otology, and dentistry." This paper, read before a dental society, was published in the *Medical News*, vol. 84, p. 730.

Kate W. Baldwin, of Philadelphia, writing in the *Jour. A. M. A.*, Jan. 31, 1903, p. 301, on "The teeth as a cause of pathological conditions in the throat, nose and ear," puts this subject on a sound basis. Since then little that the writer can find has been written upon this particular phase of the subject. Attention seems to have been diverted to the relation of eye diseases to the teeth. Numerous pathological states, reflex from disease of the teeth, occurring in surprisingly widely distributed portions of the human anatomy, are reported by those whose province lies in the teeth and jaws especially. Trismus, torticollis and spasm of the masseter and temporal muscles are recorded for instance. It is easy to see how spasm of these two muscles could cause some anxiety in a patient with both mastoiditis and impacted third molar bud.

Dr. H. W. Loeb, of St. Louis, in *Jour. A. M. A.*, September 27, 1913, p. 1205, in remarks following a paper on "Spheno-palatine ganglion," by Sluder, says: "Dr. Haskins, of New York, emphasized the influence of malposed teeth which stomatologists are able to relieve. Many patients come to the aural surgeon with symptoms referable to the nose; the skiagram shows malposed teeth, and all the symptoms referable to the nose are entirely cleared up on removal of the teeth. There are many cases with almost unbearable pain resulting from conditions in the nose; these are entirely cleared up on removal of the teeth, after the skiagram has been taken which

shows that these teeth are malposed." This passage was encountered after the preparation of this paper had been completed Its discovery gave the writer much satisfaction.

In presenting this subject it is necessary first to make clear the anatomical nerve-connection between the ear, nose and throat, on the one hand, and the teeth, jaws and parotid gland, on the other. This entails a brief review of the anatomy of the nerve-supply of the organs involved.

Case 6. Mc. L.

A. NERVES OF THE EXTERNAL AUDITORY CANAL AND PAROTID GLAND: (1) Auricularis magnus, from second and third nerves of cervical plexus; crosses sterno-mastoid muscle to parotid gland. Divides into facial branches, auricular branches (connecting with auricular branch of seventh and tenth cranial nerves) and a branch to the mastoid. (2) Auriculo-temporal branch of inferior maxillary nerve. Has two roots with middle meningeal artery between. Passes beneath external pterygoid muscle to inner side of neck of mandible;

turns upward with temporal artery between external ear and condyle of jaw; passes under parotid gland, ending over zygoma in two temporal branches. Has branches of communication with the facial nerve and otic ganglion. N. B. Has branch to membrana tympani. Sends branches to external auditory meatus, articulation of mandible and parotid gland.

B. NERVES OF THE TYMPANIC MEMBRANE: (1) The outer surface of the drum membrane is supplied by the auriculo-temporal branch of the inferior maxillary nerve as already stated above. (2) The inner surface of the drum membrane is supplied by tympanic branch of glosso-pharyngeal (see C.)

C. NERVES OF THE TYMPANUM: Tympanic plexus (Jacobson's) consisting of: (1) Tympanic branch of ninth cranial nerve. From the petrous ganglion passes through the temporal bone between the carotid canal and jugular foramen; ascends to the typanum, entering by an aperture in floor close to inner wall. Ends in two branches which ramify in grooves on the promontory. (2) Small deep petrosal nerve. From carotid plexus of sympathetic passes through wall of carotid canal to join Jacobson's nerve. Sends branch to great superficial petrosal through inner wall of tympanum in front of foramen ovale. (3) Small superficial petrosal nerve. From otic ganglion through foramen in middle fossa of skull (or through foramen ovale) passing backward to enter petrous bone again external to hiatus Fallopii; receives a filament from the facial nerve and joins Jacobson's nerve to assist in the formation of the tympanic plexus. N. B. The inferior maxillary branch of the fifth cranial nerve sends a branch to the tensor tympani muscle by way of the otic ganglion. The tympanic branch of the facial nerve supplies the stapedius muscle.

D. NERVES OF THE EUSTACHIAN TUBE: Tympanic plexus (see C.

E. NERVES OF ARTICULATION OF MANDIBLE: (1) Auriculo-temporal branch of trifacial nerve, already described. (2) Masseteric branch of inferior maxillary nerve. N. B. The infra-orbital branch of the inferior maxillary nerve to eyelid belongs to the maxillary system not to the ophthalmic.

It is to be noted relative to the above described nerve-supply: That the auricularis magnus nerve of the sympathetic is a means of communication between the parotid gland and the auricular branches of the facial and pneumogastric nerves. The latter supply the stapedius muscle and the external auditory canal and drum membrane; that the auriculo-temporal branch of the trifacial nerve

has branches of communication with the otic ganglion, and also sends branches to the membrana tympani, external auditory meatus, articulation of mandible and parotid gland; that the otic ganglion is a means of communication between the auriculo-temporal branch of the trifacial nerve on the one hand, and the tympanic plexus on the other, by means of the small superficial petrosal nerve; that the auriculo-temporal branch of the trifacial nerve supplies the tensor tympani muscle by way of the otic ganglion; that the

Case 6. Mc. L.

auricularis magnus and the auriculo-temporal branch of the trifacial nerve communicate with the facial nerve, which supplies the stapedius muscle; that the glosso-pharyngeal nerve has connection with the auriculo-temporal branch of the fifth through the otic ganglion; that the anterior superior dental branch of the fifth nerve sends a branch through the wall of the antrum of Highmore to the nasal fossa (inferior meatus and floor); that irritation of one branch of the trifacial nerve may be transmitted to the Gasserian

ganglion and thence reflected over another branch giving rise to symptoms in the regions supplied by the latter, or regions reached by it through connections with other ganglia.

It is seen then that the auricularis magnus of the sympathetic, the auriculo-temporal branch of the fifth (which supplies the external auditory meatus and drum membrane) and the tympanic plexus, which supplies the tympanum and Eustachian tube, have some sort of communication with the entire fifth nerve which, besides supplying the external auditory meatus and membrana tympani, supplies also the articulation of the mandible, the parotid gland, the teeth and the orbit. It is also to be observed that the otic and Gasserian ganglia form centers from which irritating impulses are sent out over nerves other than those which bring them in, thus originating what we know as reflexes. It is apropos to call attentention here to the relief obtained in glaucoma by injection of the spheno-palatine ganglion, and also to recall that it has been claimed that glaucoma can be the result of spheno-palatine irritation.

NERVES OF THE NASAL FOSSAE: (1) The nasal nerve of the ophthalmic division of the fifth cranial nerve enters the nasal fossa beside the crista galli, supplies the mucous membrane of the forepart of the septum by an internal branch, and that of the outer wall of the naris as far as the inferior turbinate by an external branch, ending in the skin of the ala and tip of the nose, communicating with the facial nerve. (2) Anterior superior dental branch of the fifth cranial nerve. From the superior maxillary branch of the fifth nerve in the infra-orbital foramen; runs in canal in anterior wall of antrum of Highmore supplying the incisor and canine teeth; gives off nasal branches to the mucous membrane of the inferior meatus and its floor; communicates with nasal branches from Meckel's ganglion. (3) Vidian nerve, from the superior maxillary nerve to Meckel's ganglion; is joined by a branch from the otic ganglion. It supplies the upper and back part of the septum and the superior turbinate. (4) Spheno-palatine or Meckel's ganglion. A ganglion of the fifth cranial nerve; lies deep in the spheno-maxillary fossa; its sensory root is derived from the superior maxillary nerve by two spheno-palatine branches; distributes descending or palatine branches which are almost a direct continuation of the spheno-palatine branches of the superior maxillary nerve. These branches are: (5) Anterior or large palatine nerve: descends through large posterior palatine canal, emerges upon hard palate at post-palatine foramen, passes forward through groove in hard palate nearly to incisor teeth. From the post-palatine canal

gives off inferior nasal branches to inferior turbinate and middle and inferior meati. Internal branches of Meckel's ganglion are distributed to the septum and outer wall of nasal fossa. Here we see Meckel's ganglion playing the same important part as did the otic and Gasserian ganglia in the case of the ear.

NERVES OF THE PHARYNX: (1) Posterior branches of Meckel's ganglion are distributed to the mucous membrane of the upper

Case 7. Miss M. M.

pharynx and behind the Eustachian tube. (2) The middle palatine nerve of Meckel's ganglion supplies the levator palati and azygous uvulae muscles, soft palate, tonsil and uvula. The above two nerves, the middle and posterior palatine, join with the tonsillar branches of the ninth cranial nerve to form a plexus around the tonsil, the circulus tonsillaris. The inferior maxillary nerve, its anterior division, receiving nearly the whole of the motor root of the fifth, sends branches to the masseter, temporal, buccinator, mylo-hyoid and digastric muscles. Note here the connection of

these muscles with trismus. The glosso-pharyngeal nerve sends branches to the pharyngeal plexus, and also has tonsillar branches. The tenth cranial nerve, its pharyngeal branches, join with those of the ninth cranial nerve to form the pharyngeal plexus. Here again we note the existence of inter-communication between the nerves supplying the teeth and those of the nasal fossa and pharynx; either directly, over the same (fifth) nerve, or indirectly by way of the otic or Meckel's ganglion. There is indirect nerve communication between the teeth, over the trifacial nerve, and the throat by means of the glosso-pharyngeal nerve, the otic ganglion being the means of communication between the fifth and ninth nerves. The blood vessels and lymph channels provide another means of communication between the teeth and throat and ear; but this is aside from reflex conditions. It is easy to understand how faulty eruption of wisdom teeth could irritate the submaxillary gland and ganglion, as this ganglion of the inferior maxillary nerve lies upon the gland and supplies it. The submaxillary ganglion of the inferior maxillary division of the fifth nerve lies above the deep portion of the submaxillary gland, supplying the gland and communicating with the lingual or gustatory nerve. A branch from the chorda tympani connects it with the facial nerve and the sympathetic.

In cases which will be described complaint was made of furunculosis (or local necrosis of the soft parts) edema, serous discharge, induration, itching and tenderness of the external auditory canal, trismus, otalgia, deafness, tinnitus, crackling of drum (clonic spasm of tensor tympani) autophony, enlarged, painful and tender submaxillary gland, throat pain, pain at frontal sinus and nasal voice as in abscess of the antrum of Highmore.

The connection of the different parts of the ear and throat with the teeth, jaw and parotid gland is gathered from the brief description of the anatomy of the nerves treated of above, over which the intercommunications take place. It is apropos here to note a report made by P. de Piesse in the *Ann. de la Policlin. Cent.*, January, 1912. A man suffered from neuralgia of the lower molar teeth which a dentist successively removed without amelioration of the pain. The patient was referred to de Piesse who could find nothing in the dental region, and therefore examined the auditory canal, which he found occluded with cerumen; upon removing this the pain ceased. De Piesse feels that such conditions are frequent. Here is reflex action in the direction opposite to that which we are considering.

The most typical of the cases in this series showed unerupted impacted wisdom tooth-buds as the cause of the reflex pathological condition. Other causes were alveolitis, alveolar abscess, pyorrhea, aveolar necrosis, supernumerary tooth in antrum, hyperplasia of dentin and parodontitis. In some cases the impacted wisdom buds were lying on their side developing toward the root of the second molar. As stated above in 50 per cent of people there is not room at the angle of the mandible for the wisdom tooth to erupt.

Case 9. W. B. N.

It is remarkable that in cases of impacted wisdom tooth-buds the chief complaint is not of pain in the teeth or jaw, but of reflex conditions in neighboring regions, coupled with a stiffness of the articulation of the mandible in many but not in all cases. This condition of trismus is, I believe, present in greater or less degree at some time in the history of each case. Digital examination will always elicit tenderness of the jaw in the neighborhood of the offending tooth. Optical examination will show an active or passive congestion at the same location.

The teeth are to be identified in order to determine whether the wisdom teeth are present. If found missing it is necessary to determine whether they have been erupted and later extracted. It is rather surprising how few patients are able to state definitely whether their wisdom teeth ever erupted and were extracted later. One would expect the discomfort attending the eruption of wisdom teeth to impress itself on the memory more deeply.

In cases where the wisdom teeth have erupted, and later been extracted, the region formerly occupied by the tooth is depressed, some absorption of the alveolar process having taken place. Where no eruption has taken place the level of the alveolar process is higher. In case the eruption is causing disturbance the jaw is tender and the region congested. This congestion is characterized by a purple hue of the mucous membrane over which course enlarged blood vessels.

In one case to be reported there was a supernumerary tooth in the antrum. Each of the cases to be reported was examined thoroughly by all known methods for the cause of the condition complained of before being referred for x-ray examination. Such methods included all those usual in the thorough examination of the auditory apparatus, throat and nose, including caloric and revolving tests of the labyrinth and transillumination of the mastoid and accessory nasal sinuses. The question whether diabetes could be the cause of the pseudo-furunculosis was also considered. No case of hyperostosis of the auditory canal is included, nor are any cases of chronic otitis media. All of the cases came out of a clear sky, so to speak. Reproductions of the radiograms are shown to give a clear and accurate idea of how necessary this aid is to diagnosis in these cases.

It is worth while to report a general experience of difficulty or dissatisfaction in consulting with dentists. They do not seem to be pathologists in any true sense of the term, except in a few brilliant instances. One likes to refer a patient to his or her own dentist; but when the said dentist by a careless examination, or a light remark endangers the successful outcome of much study and effort on the part of the surgeon referring the patient, the latter is not moved to refer other patients. It is hard to find a dentist who will acknowledge that perhaps there exists an impacted wisdom tooth-bud, and that perhaps all the filling and refilling, extracting and treating of teeth would have been unnecessary if the true cause of the patient's complaint had been diagnosed at the start. The writer has finally found it best to refer such cases to a stomatolo-

gist for whom he can vouch, and even then to accompany the patient to such oral surgeon for a formal consultation. The stomatologist can then be held to a thorough examination and to an appreciation of his duty to both the patient and the surgeon referring the latter.

For the present, in this preliminary report, the writer would lay greater stress on the fact that in each of these cases, in which some reflex from the teeth was suspected and the patient referred to the radiographer, the plate showed some disease or anomoly of the teeth, than on the therapeutic results obtained, although the latter

Case 10. R. S. Left side.

were satisfactory and what the patients were seeking. Careful investigations of such conditions are of far more value than clinical reports.

It is important to note again that these cases do not complain of odontalgia, else they would consult the dentist. Their complaint is of conditions in organs more or less remote from the teeth.

Of the fifteen cases to be described six or 40 per cent were caused by impacted wisdom tooth-buds. One of these had a buried incisor tooth in addition. Four or 27 per cent were due to alveolitis. One had necrosis of jaw in addition. Two or 13 per cent were due to pyorrhea. One of these had a supernumerary tooth in antrum also. One or 6⅔ per cent had hyperplasia of tooth root.

One or 6⅔ per cent had osteitis of condyle of mandible following mumps. One or 6⅔ per cent was due to buried incisor tooth. No cases of hysteria or traumatic neuro-psychosis are included.

Three cases of reflex pathological conditions in the eye will be included among the following fifteen cases.

Case 1: W. W., aged 30. Transfer business. Complained of pain in left eye. Refraction by Dr. Martin, of Phenix, Arizona, resulted in the prescription of weak cylindrical lenses which the patient stated had given no relief. This attack of eye pain was the first which the patient had ever experienced. His general health was excellent. On consulting the writer this patient complained of continued wearing-pain in the left eye with, in addition, pain and tenderness below the eye in the region of the tear sac. The latter was found to be normal. There was no epiphora or photophobia.

Examination of the eye gave negative results, except that pressure at the infra-orbital foramen elicited tenderness. Examination of the nose revealed an area of atrophy or maceration the size of a nickel in the left naris, at the anterior extremity of the inferior turbinate. This was white, wrinkled and looked as if it had been macerated. This condition called attention to the nasal termination of the anterior superior dental branch of the superior maxillary division of the fifth nerve. This nasal branch supplies the mucous membrane of the forepart of the inferior meatus and floor of the naris. It also supplies the incisor and canine teeth.

Consultation in this case with Dr. Leppenthien, of Tucson, Arizona, an oral surgeon worthy the name now passed to his reward, disclosed discoloration of the upper left incisor and canine teeth. On drilling up through these teeth, into the neural canal, Dr. L. demonstrated the flow of a serous fluid, not pus, from the canals. It was not a case of true alveolar abscess. Had it been there would have been odontalgia. There was pressure on the nerve by serous exudate which was manifested not by local but by reflex pain in the eye. Here was a case with exudate in the alveoli of the incisor and cuspid teeth, producing a nutritional change in the mucous membrane of the naris, in which complaint had been of pain in the eye sufficiently annoying and wearing to incapacitate the man for his regular work. Later pain and tenderness appeared at the infra-orbital foramen. Treatment of the teeth resulted in a complete cure without further attention from the writer.

Case 2: Mrs. S. E. McD., proprietor of an apartment house, aged 50. On February 23, 1913, both eyes had been the seat of

sharp pain, according to the patient's report. Two days later she presented herself at the Good Samaritan Hospital requesting treatment for her eyes. The writer was summoned and found the woman suffering from an attack of episcleritis, left eye. Patient reported that the right eye was first involved; that the condition on that side had cleared up and the left eye then became involved. The left eye showed violaceous hue beneath the conjunctiva, with

Case 10. R. S. Left side.

circumcorneal injection. The lids were boggy and there was photophobia with eye pain.

The history of the case and the physical examination showed only that the bowels had been markedly constipated. Analysis of the urine showed an excess of uric acid. A diagnosis of episcleritis both gouty and toxic was made. Treatment consisted of aspirin internally, atropin with hot compresses and dionin locally. These, with electric light baths followed by graduated sprays and body shampoo, cleared up the case so that the patient left the hospital on

the fifth day, being discharged from the office as cured two days later.

On June 18, 1913, this patient presented herself complaining of pain and indistinct vision in the left eye. This was about four months following the other attack. No local cause for the complaint was found in the eye. Ophthalmoscopic examination was negative, as was examination by external inspection. Further examination discovered an alveolitis of the upper left cuspid tooth. The gum around this tooth was inflamed and the process was extending across the hard palate.

The woman was referred to her dentist, Dr. Brodbeck, who in turn, referred her to Dr. Wilson, extracting specialist. There was a pivot tooth on the cuspid root. Extraction of the root cleared the case up promptly. Pus and blood were oozing from the socket when the writer examined this patient. By the first of the following month (July) the alveolar process had healed, and the eye gave no further trouble.

Whether this tooth was diseased at the time of the first attack, thus being a factor in the causation of the eye condition then demanding attention, the writer is unable to state. No complaint was made of the tooth at that time. The condition of the bowels and urine appeared to show sufficient cause for the condition which presented then.

Case 3 (see radiograph): Mrs. J. B. H., March 9, 1913, complains of pain and swelling of the right external auditory meatus and swelling and soreness of the right lower eyelid. Patient states that a "boil" in the auditory canal ruptured two weeks ago. At present there is tumefaction of the canal, but the appearance is not typical of furunculosis. The tissues of the canal are boggy, shrink under the application of adrenalin. There is no definite furuncle, only the edematous or boggy condition. Incision fails to reveal pus. The right lower eyelid is edematous. There is an area of necrosis near the inner canthus. It is not hordeolum. The necrotic area is evidently the result of nutritional disturbance, for the appearances are not those of inflammatory change.

Examination of the mouth shows congestion of the right lower jaw at the anterior bicuspid and wisdom tooth. The jaw is painful at these locations. Patient states that it has been difficult to eat or open the jaw for weeks. The right ear drum is normal and there is no evidence of disease of the middle ear or Eustachian tube. The patient was referred to Dr. Low for radiograph which showed disease of the alveolus of the anterior bicuspid before men-

tioned, and the jaw surrounding it. Dr. Shaw, oral surgeon, found on extracting the tooth that the alveolar process was diseased and that an area of necrosis surrounded it. It was necessary to gouge out the tooth which came out in two portions, the middle part having become softened. The crown was extracted and then the point of the root. Necrotic bone was also removed. This patient had become badly run down. She now began to improve and was soon discharged.

In this case the reflex process exercised a selective effect over the infra-trachlear branch of the nasal branch of the opthalmic divi-

Case 11. Miss M. T.

sion of the fifth nerve, which supplies the integument of the lids and the caruncuala lacrimalis as well as over the auriculo-temporal to the external auditory meatus.

A letter recently received from the husband of this patient is interesting as confirming the supposition that the conditions which the case presented were reflex from the diseased teeth:

October 4, 1913.

My Dear Doctor: For your information I wish to say that Mrs. H. has had no trouble to speak of since you treated her. Recently, that is two months ago, she suffered more or less pain in the eye and ear, and we feared for several days that she would likely suffer an attack similar to the one had at Los Angeles last spring. We followed your general theory and

advice and upon having a troublesome tooth removed the pain, swelling, etc., immediately disappeared. In short, we are more convinced than ever of your idea that the trouble was caused by bad teeth rather than by trouble with the eye or the ear. Your belief, in other words, is certainly confirmed in the case of Mrs. H."

Case 4 (see radiograph): Geo. W., merchant; age 52; March 6, 1913, complains of pain in right ear following a "cold." Discharge from nose has been yellow, but not profuse. On examination of nose find mucous membrane red and boggy. External auditory canal slightly tender. Drum slightly reddened, not bulging. Eustachian tube inflates easily. Hearing on that side dull. Autophony present. On night of same day had attack of severe pain which he referred to the ear. This was followed by a discharge of bright fresh blood from the external auditory canal..

March 7, seen at home. Blood-clot in canal; not much pain; Eustachian tube inflates; naris tender to catheter.

At each visit the Eustachian tube was treated with Yankauer's applicator, argyrol in 50 per cent solution being used.

March 8: No change; not much pain. March 10: No new development; Eustachian tube inflates readily. March 17: Return of pain last night. Eustachian tube open. Patient had been comfortable during the intervening week. March 19: Now complains of pain in the ear canal. Drum not red, but incised it as a precaution, obtaining no discharge. Irrigated middle ear with canula and Yankauer bottle. March 20: External auditory canal boggy, edematous. Trismus. Spasmodic pain at articulation of mandible. Condition evidently reflex. March 22: With each examination the matter of diseased teeth had been looked into. Patient had reported teeth sound and examination confirmed this opinion. No tenderness of alveolus had been elicited. To-day, however, find wisdom tooth on same side as affected ear, in upper jaw, loose. Ear canal boggy. That night there was return of the agonizing spasmodic pain (tic douloureux). It was characteristic of this pain, which occurred in paroxysms like neuralgia or neuritis, to come on at night, but not every night. March 23: Convinced the condition was due to irritation of fifth nerve by diseased teeth. Wisdom tooth very loose, second molar now loose also. Chewing is painful. Pain radiates down right side of throat. Radiograph requested. March 24: Plate shows alveoli of first and second molars diseased, with a supernumerary tooth in the antrum. Transillumination of antrum had been negative. The condition of the antrum had no effect in this case at any time.

The second molar and wisdom teeth were extracted, the patient refusing to submit to operation for removal of tooth from the antrum. The two teeth removed showed that their alveoli had been diseased. Removal of these two teeth by Dr. A. A. Shaw brought about cessation of all symptoms, the antrum remaining quiet permanently.

Case 5: Mrs. B. L. K., aged 23, March 24, 1913. Has had trouble with right ear since September, —— six months. Com-

Case 13. J. O.

plains of throbbing and slight deafness; had no nasal trouble in September; no grip. There is no history of family deafness.

Examination showed absence of naso-pharyngitis. There is absolute occlusion of right Eustachian tube at isthmus. Right drum is retracted, there being congestion along the handle of the malleus. For years has had attacks of fainting—not Meniere's symptom complex. There has been no vertigo, nausea or vomiting. The

throbbing in the right ear has been constant for the last month. This is distinct from ordinary tinnitus which comes on in attacks when she is tired.

March 28: Rinne, negative in right ear. Electrolysis with Duel's bougie to relieve occlusion, successful. To-day, C 512 fork is heard 20 sec. by b. c. 15 sec. by a. c. Does not hear Dench fork. Revolving and caloric tests show labyrinth normal.

March 31: When tinnitus is present it ceases on the employment of the Valsalva method of inflation. Right ear now hears whispered voice "66" and "22" at 18 ft. Watch, right ear, 5 ft. Acoumeter 20 ft. both ears. Right Eustachian tube inflates normally. Hearing improved. Tinnitus nearly disappeared. Rinne positive.

April 4: All conditions improved except throbbing synchronous with heart beat. Strontium bromid, gr. 15, t. i. d. Referred for radiograph. Plate showed lower right wisdom tooth impacted. It was developing against the root of the second molar. Referred to oral surgeon, Dr. A. A. Shaw, who extracted the second molar, against which the wisdom tooth was erupting. This was done because the patient refused to spend any time in the hospital, which was necessary for removal of buried wisdom bud. Patient reported relief from this procedure, but that this relief was not complete was proof that the removal of the tooth extracted was not the procedure really demanded. Later the patient reported that there was still some of the throbbing. Referred to Dr. Felsenthal for removal of the impacted wisdom bud.

Case 6 (see radiograph): Mr. A. F. McL., aged 25. September 3, 1912, came with impacted cerumen and right Eustachian tube occluded, following bathing at Bimini baths. Cerumen was removed, Eustachian tube was bougied and inflated, and application made with Yankauer's applicator.

June 6, 1913, he complained of ears. Says the canals are stuffy and sore. The right external canal is boggy and closed completely with a mass of wax and dried cerumen. Left canal is boggy and has a scab of exudate, but is not completely closed. Both canals are swollen and scaly. Drums are dull; both Eustachian tubes inflate easily. Has had yellow discharge from nose. Transillumination shows shadow over right antrum, but no discharge is secured on washing the latter.

This patient was referred to Dr. Low for radiograph. The plate showed the left upper wisdom tooth impacted. Patient was referred to Dr. Louis Felsenthal, who extracted not only the im-

pacted wisdom tooth, but also the three other wisdom teeth, because of the scanty room at the angle of the mandible.

June 30, 1913: Find external auditory canals filled with dried serum, and cerumen deeper in. The canals had been painted with pure ichthyol. Removal of the scabs showed healthy, pink, smooth skin. Right drum had been reddened and macerated by the retained exudate. Eustachian tubes were patent. The conditions present promise good results from the extraction of the wisdom teeth. Later the patient reported complete relief.

July 7, 1913, this patient reported that he had received a letter from home which bore the information that two sisters and a brother had found it necessary to have wisdom buds extracted because of insufficient room at the angle of the mandible.

Case 7 (see radiograph): Miss M. M., aged 35. December 2, 1912, referred by Dr. Frank Miller, complaining of pain in region of left ear radiating to left temporal region, for three weeks.

Case 13. J. O.

Examination of external auditory canal, membranum tympani, middle ear and Eustachian tube negative; hearing not impaired. During taking of history patient stated that she had been having trouble with the left posterior bicuspid tooth; dentist had been treating it, having removed and replaced a gold crown. The history of the case was not interesting except for the statement that there had been no menses since the age of 18. Father died of apoplexy. Patient was operated for pterygium in San Francisco eight years ago.

Patient's mouth shows no wisdom teeth. Later developments showed that all four must have been extracted.

Jaw-bone is diseased internally and externally to the left lower bicuspid tooth. Tenderness is elicited on pressure and there are evidences of congestion of the soft parts covering the bone, periosteum and gum. Referred for x-ray. The radiographer volunteered the information that the plate suggested left frontal sinusitis. This

was not present, however. The plate really showed the left lower posterior bicuspid tooth with its alveolar process diseased. This tooth was extracted by Dr. Shaw, the root showing hyperplasia (peridontitis).

The patient later had neuritic pain in left side of neck and scapular region, lameness in the back; frequent micturition, and had a uric acid storm. Here is a case of lithiasis with all nerves of the head and shoulder irritated more or less. The disease of this tooth was the exciting cause for the pain in the ear and temporo-malar branch of the superior maxillary nerve which brought her for examination.

Case 8: Mr. F. L. M., Nov. 20, 1912, aged 25; complains of pain and swelling in his right external auditory canal. Says he has had as many as 200 "boils" in his ear canals.

Examination shows right external auditory canal to be tumefied, boggy, red. Not characteristic of furunculosis, however. There must be some constantly acting cause for so many attacks of so-called boils. He had same condition in the left canal a few months ago. Drums, Eustachian tubes and middle ears found normal. Questioning elicits the fact that the teeth of both sides are tender, jaws stiff, and that he has been constantly under the care of a dentist

Examination of mouth shows abscess of wisdom teeth. Referred for radiograph to Dr. Albert Soiland. Latter shows four impacted wisdom tooth-buds, the lower one on the right side having fallen forward, was developing toward roots of the tooth in front second molar. This explains the constant demand for treatment by his dentist of the neighboring teeth which had been filled and refilled, treated and retreated.

The patient's dentist, Dr. Allin, was so unwilling to acknowledge that the impacted wisdom tooth-buds were at least probably the cause of the aural disturbance that the patient failed to see the importance of having the buds removed. He passed from view so no further report can be made.

Case 9 (see radiograph): Mr. W. B. N.; age 26, July 28, 1913 For eight months has had a swollen, tender submaxillary gland, left side. Hurts most and swells after eating. Dr. Carmody, of Denver, treated him previous to May. Left naris was operated on by Dr. Carmody in 1911. Had error of refraction also. Three weeks ago had an attack of tonsillitis.

He had measles and mumps. Gonorrhea once. No trouble with ears. Examination of naso-pharynx shows presence of adenoids. Left mandible is tender at seat of wisdom tooth-bud. Con

gestion at junction of gum and cheek at this point. Referred for radiograph. Plate shows left lower wisdom tooth-bud impacted and developing against neck of third molar.

The submaxillary ganglion of the inferior maxillary division of the fifth nerve lies against the submaxillary gland and supplies it, as stated above. The ganglion communicates with the lingual or gustatory nerve. A branch from the chorda tympani connects it with the seventh nerve. It also communicates with the sympathetic. These communications explain the activity in the region of the gland at the time of masticating food. This patient was referred to Dr. Felsenthal for removal of the wisdom bud.

Case 10 (see radiograph): Mr. R. S., age 50; merchant. May 25, 1912. Referred by Dr. Frank Miller; complained of pain in the right side of throat. On examination tonsils were found hypertrophied and much diseased—ragged and crypts filled with de-

Case 13. J. O.

tritus. At the request of the patient and his physician tonsillectomy was done. There was considerable hemorrhage, but this was controlled without difficulty. The man had long been "rheumatic."

After a time (July 18) the patient returned complaining of recurrence of pain in the throat on the same side. Examined carefully for evidence of adhesions, finding no condition to explain the pain complained of. Complaint of pain in the right ear. Examination furnished no explanation of this pain. General condition was looked into and antilithic treatment prescribed by Dr. Edelman. This gave relief for a time, but the man returned on August 2, complaining that the pain had extended so as to cover the entire right side of the head. Here was a typical trifacial neuralgia. Previous to this time the man had been advised to have his teeth carefully looked after, which he had done to the best of his knowledge and ability, the dentist reporting no disease of the teeth. When he finally came, suffering terribly from the tic douloureux, emaciated

by the agony and demanding relief, and when careful examination revealed nothing in nose, throat or ear to explain the pain, he was referred to Dr. Soiland for plate of both sides of the skull. When the plates were delivered and examined carefully by a dentist they presented evidence of diseased alveolar processes in seven different locations. Dental examination without the x-ray had evidently failed to discover the true condition present.

Treatment of the beginning pyorrhea, or alveolar inflammation, brought great relief and return to normal weight and general condition. However, the man still has pain when gouty attacks seize him; this because he will not follow the regimen suited to his physical habit.

Up to the time that the tonsillectomy was done the pain had been located in the throat only, and the man declares that he has felt like a different person since the tonsillectomy. He had evidently been much poisoned from the tonsils.

Case 11 (see radiograph): Miss M. T., age 27. February 21, 1913. Last July was ill for two weeks with mumps. At that time there was no involvement of the ear canals, except that they were scaly. This scaly condition was deep in the canals. She could not open mouth to eat or drink while having mumps, according to her report. No pus appeared anywhere at that time. She never had furunculosis of the canals at any time either previous to or following the attack of parotiditis. Only the scaly condition had shown, with a little itching and no exudate.

Has never had toothache. Has a full set of beautiful teeth. Has had attacks of sore jaws, swelling in the neck anterior to the sternomastoid muscle, and "cancres" in the throat. These attacks of cancres would last from two to three days to a week. Had one of these attacks just before the attack of mumps. Examination showed the ear canal to be boggy, scaly and tender. Identification showed the full number of teeth. Drum membrane normal, hearing normal. There is passive congestion in the fauces with tenderness of the ramus of the left mandible. Advised radiograph, when thorough examination discovered nothing additional. The plate showed areas of disease in the ramus of the left mandible near the condyle.

By April 7, the right external auditory meatus had recovered under treatment with pure ichthyol. Complained at that time of the left side. Has had a return of the swelling in the neck since here last. Mandible still tender at the angle. Nose and naso-pharynx absolutely normal.

This case was referred to Dr. Felsenthal for treatment; but her father being very ill, the matter hung fire for some time. Treatment with iodin ointment, iodides internally, etc., was followed during the interval of waiting. Finally the case passed from view.

The condition in the ramus of the mandible was evidently the sequel of the attack of parotiditis. The ear canals were much tumefied and tender when the condyle of the mandible was moved in mastication. Trismus had existed to a greater or less degree from time to time. The radiograph showed a perfect set of teeth and repeated examination failed to discover any anomaly in the middle ear. The waiting-policy adopted by the patient on account of the illness of her father evidently allowed Nature to bring about a cure with the little assistance which could be given by the prescription of external applications.

Case 14. H. H.

Case 12: Mr. J. P. D., age 50. September 4, 1913. Three weeks ago began to be troubled with soreness of the throat on swallowing. The "cords" (glands) of neck were sore. This continued five days and then disappeared. Last week the same condition returned. There was no toothache.

Examination revealed tenderness of the right submaxillary gland with slight enlargement. The right tonsil and same side of the soft palate were red and congested. Thorough search failed to discover any evidence of peritonsillar inflammation.

In spite of the redness of the tonsil and palate the throat did not appear boggy or the seat of a real diseased condition. The tonsil had been operated upon at some time with the guillotine, the remaining tonsillar tissue being fibrous and adherent to the pillars, so that it could not be separated from the pillar in searching for abscess. Patient has four wisdom teeth. Had "ulcerated" tooth (second right upper molar) extracted three months ago. Now the next

tooth back (wisdom) is tender. Larynx normal except for a puerile epiglottis.

Referred to his dentist, Dr. Reed, who found disease of the tender wisdom tooth, treatment of which cleared up the condition in the throat.

Case 13 (see radiograph): Mr. J. O., age 17. December 12, 1912. Complains of pain in the ears, more or less indefinite in location, and character, sometimes evidently located at mastoid region. Mastoids transilluminate well with Mosher's transilluminator. There is bilateral chronic catarrhal (moist) tubo-tympanitis with left Eustachian tube closed by swelling of mucous membrane. There is marked deviation of the nasal septum with immense middle turbinate crowded between the septum and lateral wall. Vertical diameter of the nares short.

During December the aural condition was treated with good success, the Eustachian tubes remaining patent, and the hearing becoming normal. On January 3, a submucous resection was done. This gave relief, but there was still complaint of the pain, ache, discomfort just back of the mastoid region. On January 8, a partial middle turbinectomy was done for the purpose of supplying greater air passage. Relief followed these procedures, but this was not complete.

On July 7, refraction (retinoscopy) was performed. There had been much complaint of pain at the glabella and occiput. Search failed to disclose any evidence of intra-cranial involvement or sinusitis, except that the nasal accessory sinuses did not transilluminate perfectly well.

Refraction revealed the following: Paresis of the external rectus amounting to 2 deg. Retinoscopy showed: O. D. plus .25 with plus .25 at 120. O. S. plus 3.00 with plus .50 at 120. A prism was prescribed for the purpose of determining whether there was an element of muscular strain in the causative factor of the head pain. There was much relief from this formula, but the ache at the back of the head did not disappear.

The teeth had been examined from the first, but the boy, being a Greek newsboy could not see the connection between the teeth and the pain complained of, so he failed to go for x-ray examination. Finally it was demanded in strong enough terms to produce results. Examination of the mouth had shown absence of wisdom teeth. Other teeth were missing, supposedly having been extracted.

The radiograph, taken September 5, 1913, showed that the up-

per wisdom teeth were erupting normally. But in the upper jaw, right side, there is a tooth lying buried above the roots of the lateral incisor, canine and anterior bicuspid. This is the middle incisor with its cutting edge pointing forward. Below on the left side the wisdom tooth is developing against the root of the second molar, having caught under the crown at the neck. The wisdom tooth of the right side below is missing, probably having been erupted and extracted. A tonsillectomy had been attempted on this case before it came to me. The operation was not a success.

Here is a case in which tonsillotomy, submucous resection, partial turbinectomy, and refraction were performed for the relief of pain and ache, which were distressing even to a newsboy. Relief was gained, but the real condition at the root of the matter existed in the teeth. It was necessary to eliminate the various possible causes of the distress, in order to make an absolute diagnosis. This was done, the various procedures being carried out, while all the time there was effort to induce the boy to go for radiographic examination. The boy was referred to Dr. Louis Felsenthal for further relief.

Case 14 (see radiograph): Mr. H. H., age 26, November 11, 1912, complains he has had partial deafness in both ears for one week. Has had "ear trouble" off and on for several years. Dr. Hill Hastings had operated on nose some time before. With each cold that he has the tonsils "swell up." Had scarlet fever as a child. Grip and colds since then at times. Has had slight discharge from ears for the last week, more from the left. Throat is hoarse all the time. Examination shows deflection of the septum; but he has plently of air way. On account of condition of tonsils and their influence on the auditory apparatus tonsillectomy advised, which was done at the Good Samaritan Hospital. Result perfect. The ear condition was treated and cured, such improvement being assured by the removal of the tonsils.

On November 1, 1913, came complaining that the external auditory meati were "stuffy," the head feeling "stuffed up" also. Has had headache for two days. Examination shows the nose, naso-pharynx and larynx normal. The Eustachian tubes inflate perfectly. The external auditory meati are boggy and scaly, but not inflamed. There is tenderness at the infra-orbital foramen, left side. The left second upper molar has been giving trouble. The right sub-maxillary gland is tender. The left lateral incisor tooth is painful. Referred for roentgenograph. Plate shows the lower

right cuspid impacted below three incisors and lying lingually to their roots. Referred to Dr. Felsenthal for further investigation and treatment.

Case 15: Mr. R. C. B., January 23, 1913, came to have left ear examined. Dr. Welty, of San Francisco, had done radical mastoid operation, with skin grafts, and advised patient to have the ear examined every three or four months. The canal and cavity have been itching.

Examination shows the skin to be in good condition. Shed epidermal scales were removed with H_2O_2 and curette, and tr. benzoin comp. applied. This patient reported for such examination and cleansing a few times. On September 25, 1913, he came fearing that pus was forming in the cavity of the operated ear. He had been allowed to go into the ocean with cotton saturated with vaseline (sterile) in the ear canal, provided he would not dive or get his head under water. On this date no untoward condition was found. On October 9, 1913, a smear obtained from the cavity showed a few staphylococci and a few encapsulated diplococci, no more than would be found in any canal. On November 7, 1913, this man came with complaint of much moisture in the operated cavity. The skin lining the latter was found normal. No break in the skin was ever found, but at this time coagulated serum was removed from the canal. The writer became convinced that a reflex could cause such a discharge of serum in an ear which had been operated as well as in any other. So the man was referred for radiograph. Plates showed right lower wisdom bud impacted, unerupted, and lying on its side with cusps pointing forward.

Case 16: Miss A. T.; nurse; age 23; irritation of the right eye. Examination showed the trouble located in the right caruncle, the conjunctiva being normal. The caruncle appeared irritated. There was no evident secretion at the canthus. With the loupe the caruncle presented the appearance of vesicles at the roots of the lanugo hairs. Argentide solution was rubbed into the caruncle and argyrol ointment prescribed.

Inquiry elicited the information that Miss T's dentist had just told her that her teeth needed treatment. This inquiry regarding the teeth was made because the eye condition was anomalous, not presenting characteristics of any condition belonging to the eye inflammations.

Dr. Lane, the patient's dentist, reports finding "blind abscess" of the lower right second molar. The upper right second molar also

demanded treatment. Treatment of these conditions relieved the eye symptoms promptly. It was interesting to note that the first dental treatments resulted in some irritation of the eye.

Another interesting point is that reflex conditions in the eye from diseased teeth are just as apt to result from tooth disease in the mandible as from that in the upper jaw.

Case 17: Mr. W. C. A., age 34. December 1, 1913: Right submaxillary gland tender and swollen. Complains of expectorating blood-stained sputum; fears tuberculosis of larynx; has had pain radiating from lower right wisdom tooth, which is relieved by pressure on jaw. At the age of 3-4 had pneumonia. Had bronchitis and pleurisy three years ago. Has had frequent colds. Two weeks ago had an attack of bronchitis, followed by the bloody expectoration which constitutes his chief complaint now.

Examination shows deflection of the septum to the left against the inferior turbinate. Naso-pharynx normal. Pharynx shows irritation. Patient smokes considerably. The tonsils and larynx present an absolutely normal appearance. He has a lingual varix from which the bleeding has perhaps taken place. Next to the expectoration the pain radiating from the lower right third molar was uppermost in his mind. Investigation showed this tooth leaning in toward the tongue very markedly. The jaw in its immediate neighborhood is tender and aching.

Diagnosis of irritation of the inferior maxillary nerve by the roots of the malposed wisdom tooth, manifesting itself as the radiating pain, and tenderness of the submaxillary ganglion and gland.

Referred to Dr. McLeod, his dentist, who, in turn, referred him to Dr. A. A. Shaw for extraction. On December 18 reported entire and prompt cessation of the pain and bleeding. Submaxillary gland still slightly tender.

This man was deeply worried by the bloody expectoration and the "pain in the throat." The only pathological lesions discoverable in the nose or throat were the deflection of the septum and the lingual varix. The conditions complained of were, no doubt, due to the irritation from the malposed tooth. This includes the lingual varix which was passively congested as a result of the irritation over the inferior maxillary nerve.

Case 18: Mr. E. W., age 29. (December 18, 1913.) For some time past the right ear has been the seat of paroxysms of pain which were short-lived. This ear is sore. When the outer part is touched

or pressed upon, "a hurt goes through the head." This condition has existed off and on. Four or five days ago the soreness or pain that existed disappeared suddenly one evening after going to bed. When 8 years old had typhoid. Nine years ago had anterior poliomyelitis—the right arm is almost completely paralyzed.

Examination shows the drum to be normal. Normal vibration with Siegel. The canal is normal in appearance; is tender to pressure at one spot, "needle prick." Stroking down the tissues over the styloid process causes a hurt which radiates up into the ear canal. Passing the speculum into the canal does not hurt but rather "feels good." Hearing is absolutely normal and acute. There has been no earache, no otitis media or discharge. Hears all forks including Dench's; Weber equal, Rinne positive.

He has three wisdom teeth erupted during the last few years. There is no sign of the right upper wisdom tooth. It has never erupted. No extraction of a tooth in that region. The lower jaws present a white macerated appearance at the region of the molars. There is tenderness of the jaw at the seat of the right upper wisdom tooth.

Diagnosis: irritation of ear canal and mandibular articulation by unerupted wisdom tooth-bud. The symptoms of trismus has existed in this case from time to time. The paroxysm of cramp-like pain in this case have been typical. Here again the patient had never had any intimation that all was not well with the teeth. Said his teeth were in perfect condition according to the report of his dentist.

Referred to Dr. McCoy who found (by x-ray) and removed a very large impacted wisdom tooth-bud, upper right.

1121 Brockman Building.

Hemorrhage From Air Passages. A. ZOGRAFIDES. *Monatschr. f. Ohrenh.*, Heft 2, 1913, p. 385.

One case of vicarious menstration from the larynx, two of spontaneous hemorrhage from the trachea and one of hemmorrhage from the right arytenoid cartilage are reported. ED.

SQUAMOUS EPITHELIOMA OF THE MIDDLE EAR AND MASTOID.

Dr. L. J. Goldbach, Baltimore.

Mrs. J. D. D. consulted me January 30, 1912, and stated: "I have a discharge, growth and a sinus in the back part of my left ear, and for the last year I have been suffering pain off and on. From the latter part of November, 1911, the pain has been excruciating and almost unbearable; at times dizzy spells with the head so tender that I could not rest it on a pillow. On December 12, something broke behind the ear, and since then I have had some relief." Otoscopical examination revealed a protruding polyp, bathed in an offensive, purulent discharge. A probe placed in the sinus at the tip of the mastoid led me into the canal wall, at the osseous and cartilaginous junction. The polyp was grayish, rather hard to palpation and completely filling the canal. Pressing the polyp inward I could produce vertigo, with a tendency to fall towards the right side. No tenderness on pressure; temperature 99.1°; pulse 70; respiration 22.

Her past history is of no special interest. At the age of 8 years, she had scarlet fever, leaving her with a discharging ear. The physical condition of the patient is that of a well-nourished, robust woman, suffering from no physical ailments, and "well and hearty, until this ear started to give me trouble." I ordered 10 per cent formalin irrigations, ten drops to half a tumbler luke-warm water, and advised her to return for a radical mastoid operation.

She entered the Presbyterian Hospital February 10, 1912. Her physical and urinary examinations were negative. The blood-count showed a leucocyte count of 12,500; the differential—polymorphonuclear 73, small mononuclear 17, large mononuclear 14, eosinophiles, 5.

On February 1, 1912, under ether anesthesia, I removed the polyp. It bled freely and was fibrous, giving the impression of a fibrous angioma or sarcoma. A radical mastoid was performed. The bone was sclerotic, with apparently no air cells. After removing the osseous canal wall and curreting the middle ear and antrum, I encountered very free bleeding from the granulations, giving one the impression of a sarcoma. After as thorough a removal of the granuloma as possible, the wound was cauterized with nitrate of silver stick, gauze drain inserted, head bandaged and

patient returned to bed. The patient rallied nicely with no evidence of shock. On February 9, she complained of vertigo and vomiting which disappeared after dressing the wound. February 25, the patient returned to her home. The mastoid wound healed, but a slight oozing from the canal remained. Since the operation, patient has been free from pain and "feeling fine." The pathological report was fibro-angioma.

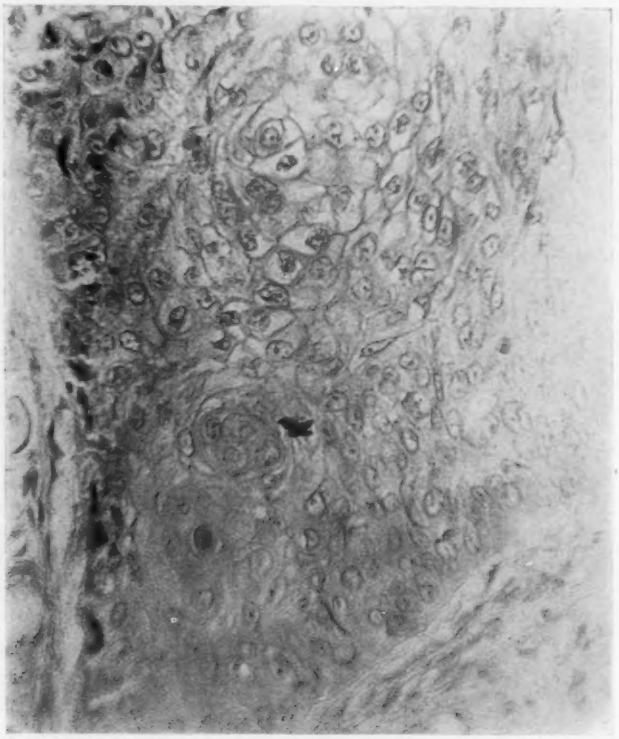


Figure 1. High Power Microscope.

June 1, the patient returned with growth from canal and old mastoid wound; concha very perceptably tender, red and infiltrated. The old wound was vigorously cauterized with the electric cautery. The cauterizing seemed to have some beneficial effect. Since the neoplasm bleeds freely it is troublesome to cauterize it properly. On questioning the patient she said she first noticed the growth in back of ear, March 16; it slowly grew larger; otherwise

she was comfortable. She returned to my office off and on for the following six months and I cauterized the neoplasm with silver nitrate stick, alternating with the electric cautery. December 27, she returned with growth occupying canal and concha; whole of ear hard and thick, and growth pushing its way out through the mastoid shell. Patient suffering pain. The growth bled very freely and was hard at some places, at others soft. I suggested operation to relieve pain and tension. She gladly consented. The blood-count, leucocyte 10,400, differential—polymorphonuclear 73, small mononuclear 17, large mononuclear 12, eosinophiles 6.

December 31, under ether anesthesia, I opened the old wound. I found the whole mastoid cavity tightly packed with a fibrous bleeding growth, and the glands at tip of mastoid and neck involved.

These I removed. After thoroughly removing all of the growth from the middle ear, antrum, neck and side of face, I cauterized with the electric cautery the surrounding area of the mastoid. The pathological report from Dr. Maldeis: Gross examination—Large piece about size of walnut; several smaller pieces each size of pea. Tissue consists of rather dense mass. One section shows considerable amount of fibrous connective tissue, having pearly-white appearance of carcinoma. Few areas of necrosis scattered through mass. On outer surface there is an abundance of granulation tissue.

Microscopic Examination: Specimen shows numerous areas of epithelial cells grouped into definite masses. In places, central part of mass shows whirl of flattened cells with keratin deposits. There is an abundance of connective tissue, separating cell groups. Very few blood vessels. There are areas suggesting papillomatous growth and it is probable that the original tumor was of this nature.

Diagnosis: Squamous carcinoma. Dr. Winternitz reported: Microscopical sections made from portions of the tumor from the several different areas show practically the same general appearances. The tumor forms an infiltrating mass composed of nests of cells which are found everywhere scattered in the surrounding tissue. They are actively invasive and infiltrate the striated muscle fibers which are present in this area. The nests of cells form false alveoli and in most instances are quite cellular and solid. In a few cases the centers of the nests are pale, and the cells approaching the center grow larger. The cells themselves vary slightly from cubical to large squamous cells, are slightly irregular in size and their nuclei vary also somewhat both in size and in chromatin con-

tent, and not infrequently mitotic figures occur. The tissue surrounding the cell-mass is fibrous tissue stroma in which there are numerous mononuclear lymphocytes. There is no necrosis present in the tumor throughout any of the sections. The picture is that of a typical squamous cell epithelioma with a tendency to form epithelial pearls.

Figure 2. Low Power Microscope.

The wound healed slowly; her temperature ran a fairly normal course, never exceeding 100° F. The deeper glands in the neck enlarged and now the whole side of the face is red, edematous and painful to pressure. The pain is worse when lying down. The patient retains her well-nourished physical condition. At the present time there is no indication of brain pressure.

322 North Charles Street.

TONSILLECTOMY IN THE UPRIGHT POSITION UNDER ETHER.*

Dr. W. H. Roberts, Pasadena, Cal.

The position of the patient while being operated under ether for the removal of diseased tonsils is one that deserves serious consideration. As we constantly see and treat the throats of our patients while they are sitting upright, we naturally acquire a familiarity with the relationship of the various structures as thus presented to view, and we attain a manual dexterity in our treatments which a change in the patient's position necessarily lessens. It would seem that tonsillectomies could be more readily performed with the patient in the upright position than in any other, if the patient can be safely placed in the upright position when under ether.

Before adopting the upright position for tonsillectomies under ether, I carefully investigated the possible hazards of this position. I knew that for years it had been the custom of the nose and throat surgeons on the staff of the Massachusetts Charitable Eye and Ear Hospital to do all tonsil and adenoid operations under ether with the patients sitting up in a chair. While there, I inquired for fatalities following these operations, and I learned they had had none. Personal communications from various friends of mine who had been connected with this hospital were to the effect that there never had been a fatality in Boston that could in any way be ascribed to the upright position.

For the last ten years I have done practically all my tonsillectomies after the manner about to be described, and I have yet to see any unfavorable condition either during or after the operation that could be attributed to the upright position. This position, in addition to the advantage of having the parts in the position in which we are the most familiar with them, offers several other advantages: 1. The ease with which the field of operation can be illuminated, either by an electric headlight, or by natural or artificial light coming from behind and above the surgeon's head. 2. The ready accessibility of the parts to be operated on. 3. The freedom with which an assistant can hold instruments and can

*Read at the Meeting of the Western Section of the American Laryngological, Rhinological and Otological Society, Oakland, California, April 15, 1913.

sponge the field of operation. 4. The simple control of the hemorrhage at its source, and the prevention of the entrance of blood into the larynx. 5. The thoroughness with which the operative field can be examined for tonsil remnants, tissue shreads and bleed-

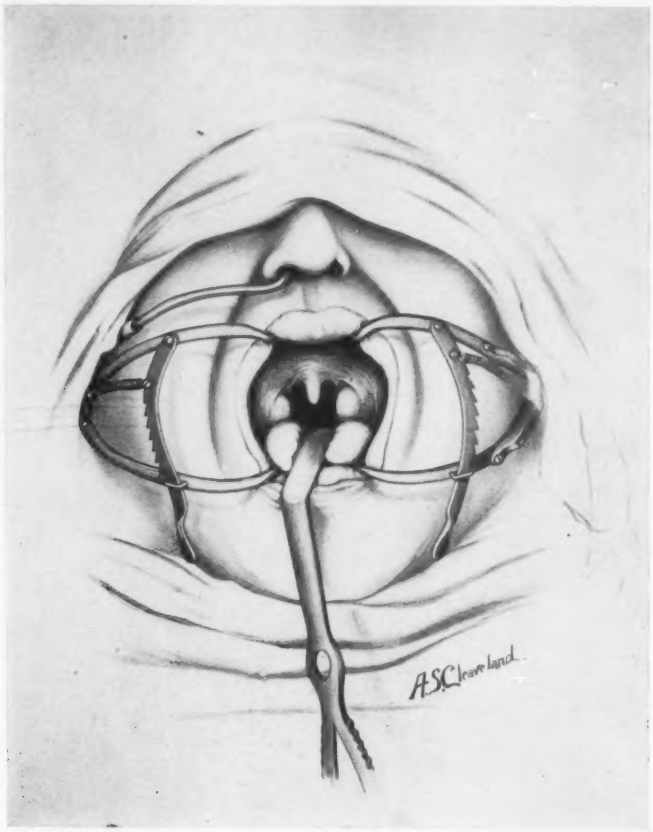


Figure 1. Whitehead gag in position. Tongue controlled by a separate tongue depressor. Ether administered through a nasal tube.

ing points after the enucleation. 6. The ease of control of the patient's head by the anesthetist.

The entrance of blood into the larynx during the operation is an objection raised by some to the upright position.

Dr. R. Bishop Canfield, of Ann Arbor, has examined the larynges of many patients operated in the prone, as well as in the upright position. In a personal communication he says: "There seemed to be no more blood in the larynx after operations in the upright po-

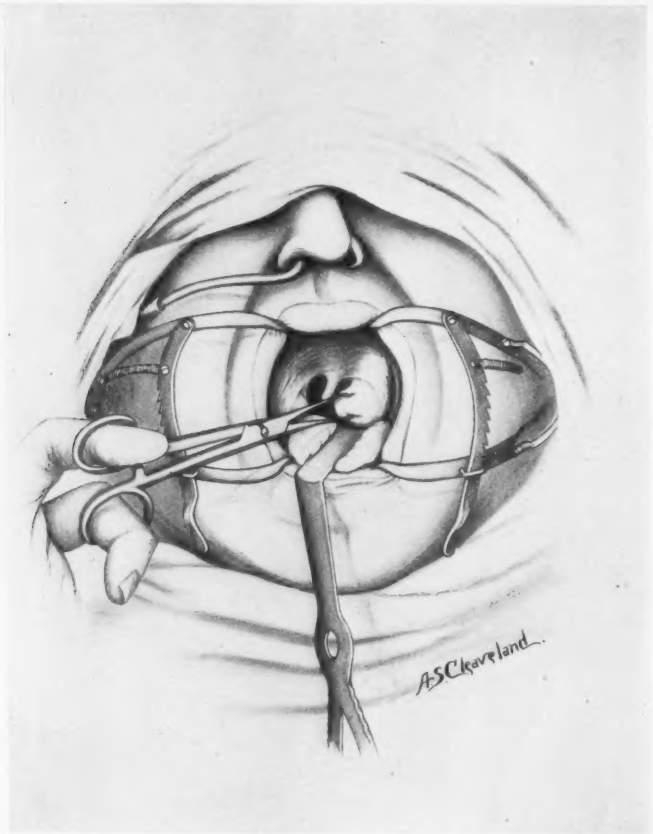


Figure 2. Traction being made on the left tonsil, outlining the upper portion which is usually concealed in the supra-tonsillar fossae.

sition than after operations in the recumbent position. In no case was the amount of blood excessive; it appeared more like a stain or a small thin clot. The vocal cords were streaked in some cases; in others, the posterior wall showed a little dry blood. In my experience, there is much less blood in the mouth and pharynx

during operation in the upright position than in the supine position. I have never seen any accident that could be attributed to operation in the upright position. This statement covers several thousand cases."

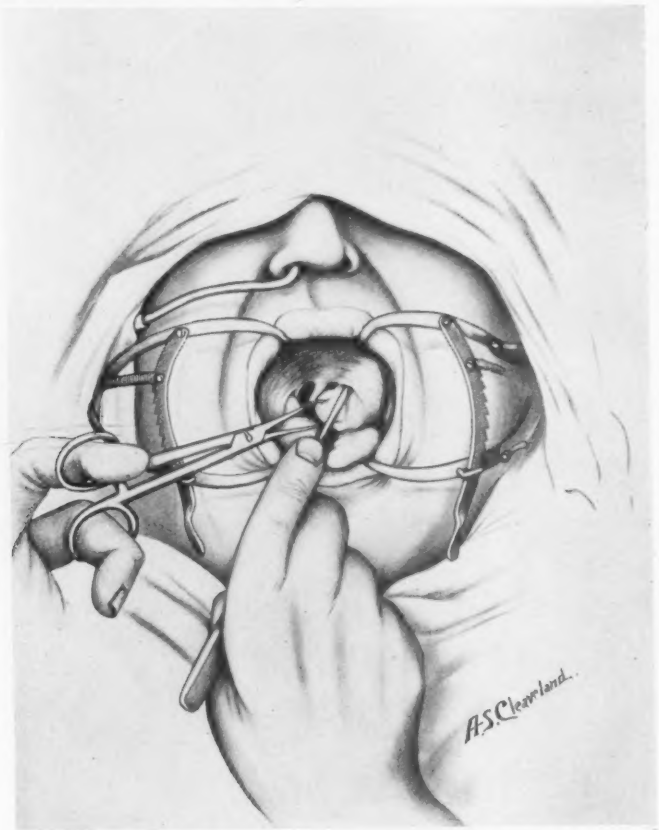


Figure 3. Knife-blade entering one millimeter above the semi-lunar margin of the plica supra-tonsillaris and keeping between the plica and the tonsil capsule.

The amount of blood gaining access to the larynx depends on the depth of the anesthesia. The patient should never be so deeply anesthetized as to be unable to swallow the blood and mucus that might collect at the entrance to the esophagus. It is obviously easier

to swallow in the upright position than when lying prone. Further, the anesthesia should be so timed that the patient will be partially awake at the conclusion of the operation. As the anesthesia is so important a part of the operation, it necessarily follows that

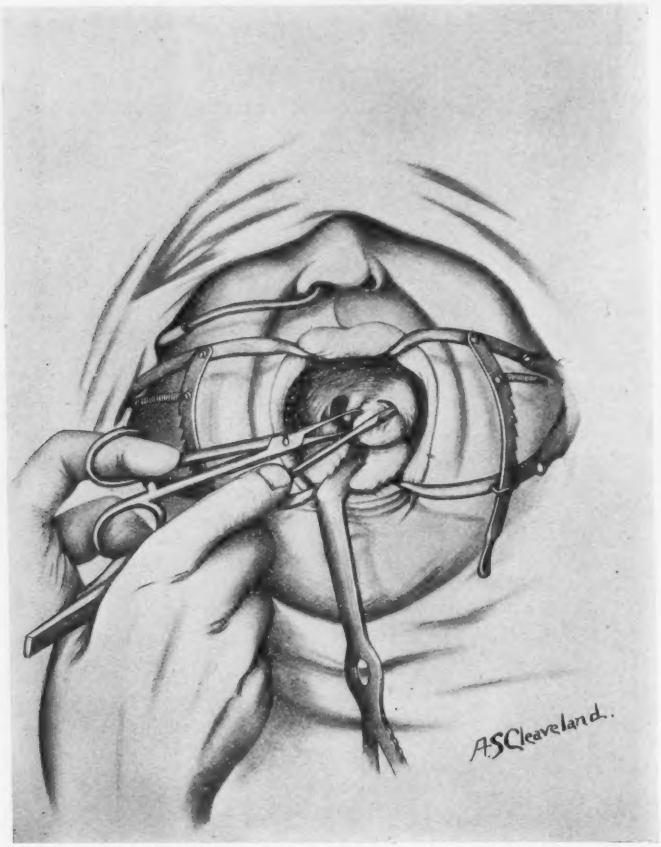


Figure 4. Freeing the anterior pillar with blunt-pointed Tyding's knife.

it should be administered only by an expert, and by the one who is accustomed to the surgeon's technic.

The instruments are arranged in the order of their use on a table at the surgeon's right. The assistant stands at the surgeon's left, beside a table containing the sponge-forceps which are loaded

by a nurse as required. Another nurse acts as an assistant to the anesthetist. The various stages of the operation are as follows:

1. The patient is anesthetized in the prone position, and, when thoroughly under the ether, is placed in a chair in front of the

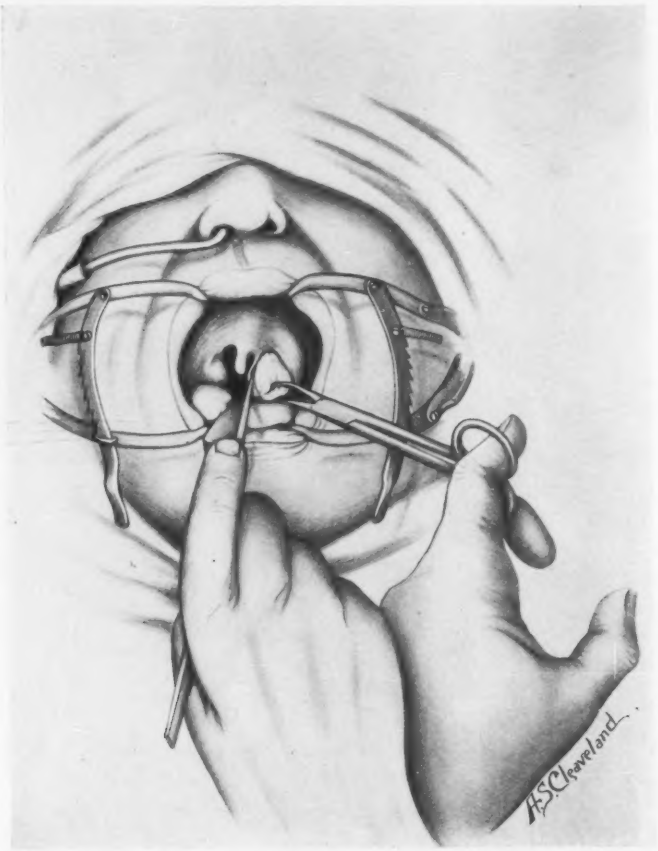


Figure 5. Freeing the posterior pillar with blunt-pointed Tyding's knife.

operator, who is so seated that his head is about on a level with that of the patient.

2. The anesthetist then stands behind the patient, so as to control the head and to continue the administration of the ether through a tube introduced through the right nostril. A foot-pump forces air

through a bottle containing the ether, and the vapor is carried by a rubber tube to the patient's nose.

3. The patient is covered from the neck down with a sterile sheet that extends over the surgeon's lap; a Whitehead gag is in-

Figure 6. With the index-finger determine whether or not the tonsil is free in the supra-tonsillar fossae and separated from the anterior and posterior pillars.

serted; and, after depressing the tongue, the parts are inspected and all mucus is wiped from the pharynx. (Figure 1.)

4. The left tonsil is then firmly grasped by a vulsellum forceps (Figure 9-a), and sufficient traction is made upon the tonsil to cause

its concealed outlines fully to be revealed behind the pillars (Figure 2). This is very important, as it at once shows the large portion of the tonsil occupying the supra-tonsillar fossae.

5. While keeping traction on the tonsil with the vulsellum, a small incision is made one millimeter above the semi-lunar margin

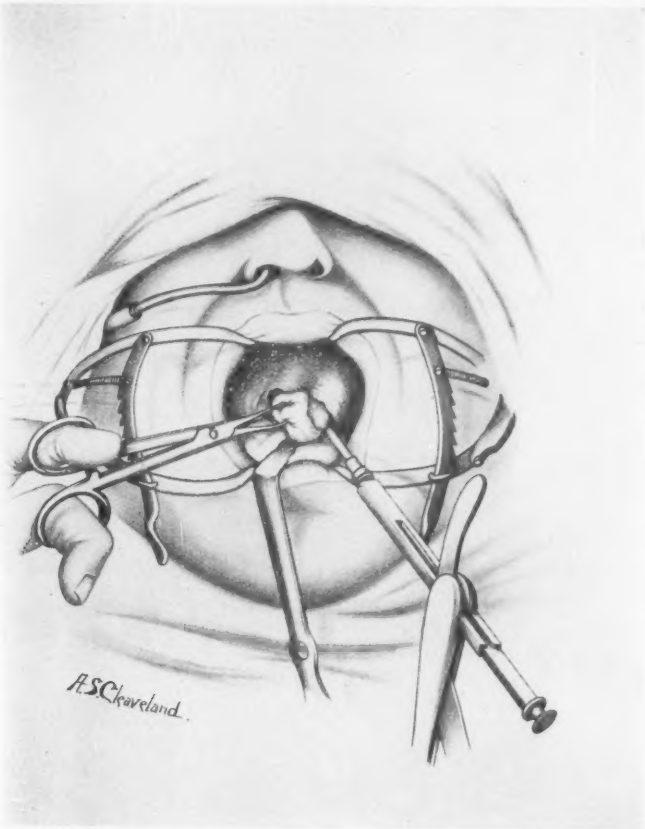


Figure 7. Slipping the loop of a Tyding's snare over the dissected area.

of the plica triangularis or plica supra-tonsillaris. This is done with the small-bladed knife shown in Figure 9-b. The knife blade should pass well up between the capsule covering the anterior portion of the velar, or supra-tonsillar lobe, and the plica supra-ton-

sillaris (Figure 3). It is very important that this incision be not too deeply placed for fear of getting inside the capsule of the tonsil. The secret of the success of any tonsil enucleation lies in

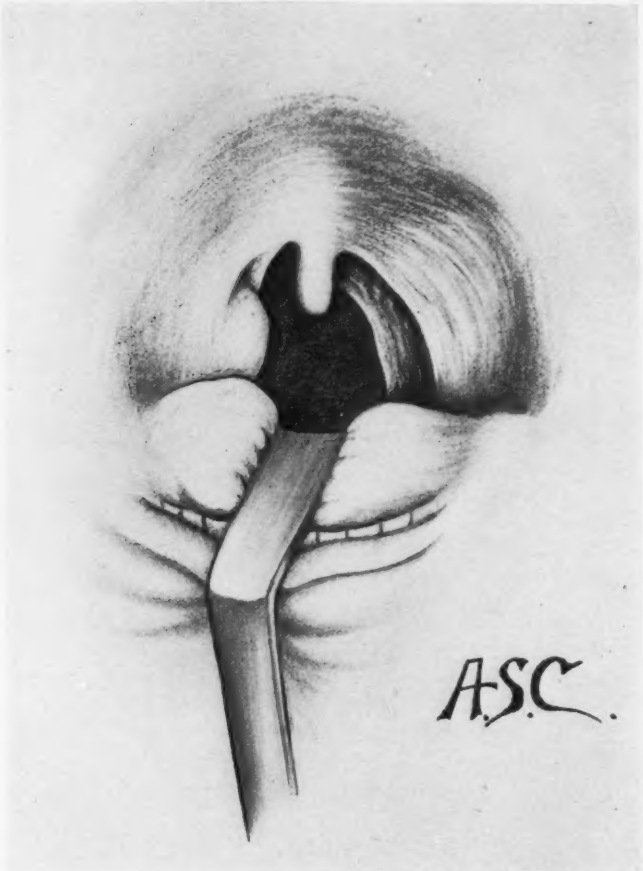


Figure 8. Appearance of the pillars after removal of the left tonsil.

keeping just outside the capsule of the tonsil and in keeping inside the tonsil fossae. Fetterolf, in a recent article, deals with this point in a very thorough manner. (*American Journal of the Medical Sciences*, July, 1912, page 37.)

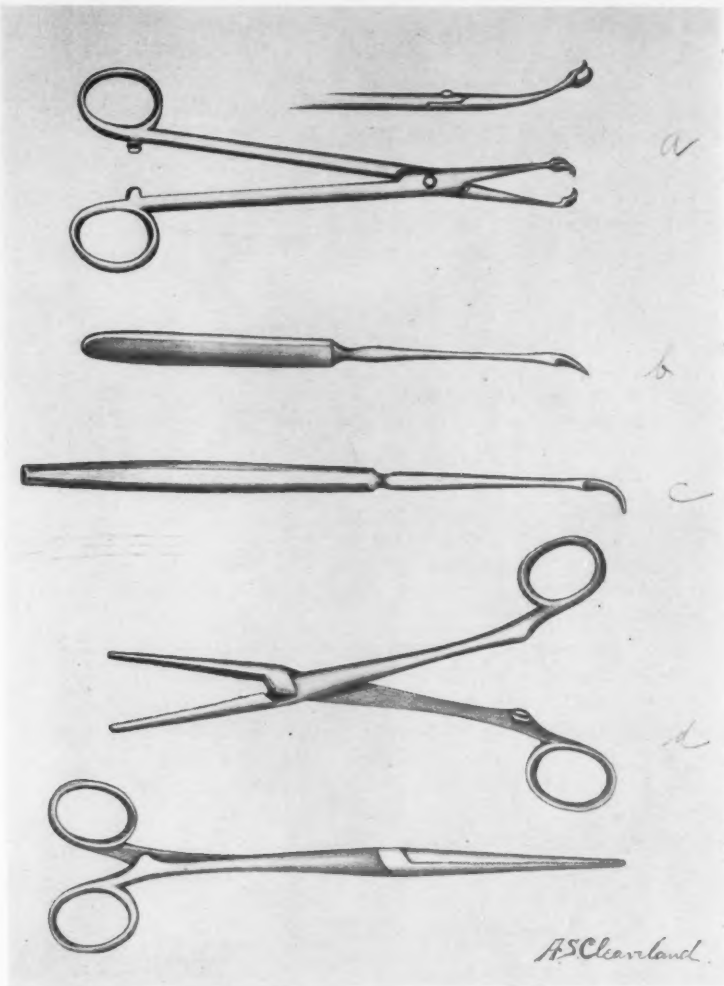


Figure 9. (a) Vulsellum forceps. (b) Knife for primary incision. (c) Tyding's blunt-pointed knife. (d) Combined sponge forceps and artery clamp.

6. A blunt-pointed Tyding's knife (Figure 9-c) is then used to free the tonsil-margin from the mucous membrane layer of the plica triangularis, first along the anterior pillar (Figure 4), and then along the posterior pillar (Figure 5).

7. The tongue-depressor should now be removed; tension should still be exerted on the tonsil, which is grasped by the vulsellum; the index-finger of whichever hand is more convenient is passed over the top of the tonsil between the capsule and the supra-tonsillar fossae (Figure 6). If the finger meets with resistance, reintroduce the Tyding's knife and sever any bands which may prevent the finger entering the supra-tonsillar fossae. Then gently sweep the finger down between the anterior pillar and the capsule, and between the posterior pillar and the capsule; pay particular attention, by digital dissection, to the freeing of the tonsil at its inferior portion near the tongue.

8. Having satisfied oneself by means of the finger that the dissection is finished and the tonsil free from any attachments in the supra-tonsillar fossae or to either pillar, slip the loop of the Tyding's snare over the handle of the vulsellum which is still making traction on the tonsil, and carefully work the loop behind the tonsil. (Figure 7.)

9. The field of operation should now be carefully sponged before tightening the wire, in order to satisfy oneself by inspection that the uvula and the pillars are not included in the loop. The loop is slowly tightened, and, when the tissues at the back of the tonsil-capsule are cut by the wire, the tonsil is removed by the vulsellum.

10. Instantly the assistant introduces into the tonsil fossae a gauze sponge on a sponge holder, making pressure till the bleeding stops. Should occasion require, these sponge holders can also be used as artery clamps to control any persistent bleeding (Figure 9-a). I have never found it necessary to tie a vessel.

11. After checking the bleeding, the right tonsil is removed in the manner just described for the removal of the left tonsil.

The appearance of the pillars after the enucleation of the left tonsil is well shown in Figure 8.

461 East Colorado Street.

HYPERTROPHIED TONSILS AND ADENOID VEGETATIONS IN PUBLIC SCHOOL-CHILDREN IN NEW YORK CITY.*

DR. S. JOSEPHINE BAKER, New York City.

At a meeting of the Laryngological Section of the Academy of Medicine on March 26, a motion was passed authorizing the Secretary to send to each member a circular letter embodying certain questions regarding the relation between the Board of Health, through its school medical inspectors, and the occurrence of hypertrophied tonsils in public school children. Later, this report was used by the Public Education Association as the basis of resolutions which were sent to the Board of Health, asking that the inspectors recommend, in each case of hypertrophied tonsils, whether or not operation should be performed.

Section on Laryngology & Rhinology of the New York Academy of Medicine.
Associated Out-Patients Clinics of the City of New York,
17 West 43rd Street, CITY.
New York, April 23, 1913.

Dear Sirs:

Desiring to comply with your request for an expression of opinion from the members of the Laryngological Section upon certain phases of the "Tonsil Situation" in this city, the matter was brought before the Section at the regular meeting on March 26. On motion, the Secretary was instructed to send to each member a circular letter embodying the questions contained in your communication. Some seventy responses were received, and the following report embraces the opinion of the majority of those who answered this letter.

Question 1: Should the present widespread practice of tonsillectomy in children be continued and the school inspectors encouraged in urging parents to have their children's tonsils removed?

Answer: (a) Tonsillectomy in children should be advised only by those specially trained to recognize the conditions demanding this operation. (b) The average school inspector and visiting nurse is incompetent to decide this question. (c) Parents should not be advised to take their children to certain institutions as this encourages many to seek charity who otherwise would not do so; thus tending to pauperize the community. The majority favor tonsillectomy in every instance, but some few believe that tonsillectomy still has its place.

Question 2: Should either tonsillectomy or tonsillotomy, or both, be performed in Out-Patient Clinics?

Answer: (a) The majority believe that both operations are operations requiring the facilities of a hospital. (b) A small minority believe that both operations can be safely done in an Out-Patient Clinic, while some few believe that tonsillotomy, but not tonsillectomy, may be done without hospital facilities.

Question 3: If the previous question is answered in the affirmative, what facilities should be provided for the surgical treatment and after-care of these patients? Should operations be performed in dispensaries (a) which have no special operating room (b) which have no recovery room where patients may be kept after operation?

Answer: The few who think that this operation can be safely performed in a dispensary, believe that a recovery room should be provided where patients may be kept for several hours under observation.

Yours very truly,
Signed C. D. VAN WAGENEN, M. D.,
Secretary.

Signed, WILLIAM WESLEY CARTER, M. D.,
Chairman.

The answers to the questions sent out by this Section seem to me to indicate a misunderstanding in regard to the Department of

*Read before the Section on Laryngology and Rhinology of the N. Y. Academy of Medicine, December 17, 1913.

Health, and therefore it is my desire to place the facts clearly before you. The importance of this subject merits consideration, as the department, through its school medical inspectors, supervises the health of 825,000 school children of this city. Since 1905, the system of school medical inspection has included the physical examination of each child on its entrance to school and on an average of every three years thereafter. School inspectors are all appointed from lists furnished by the Civil Service Commission, and are all physicians licensed to practice in the State of New York. The majority are graduates of New York City Colleges.

During the early part of this work it was reported by these inspectors that approximately thirty per cent of the children in the schools were suffering from hypertrophied tonsils, with or without a form of obstruction to the nasal breathing which implied the presence of adenoid growth. It was the desire of the department to fix a standard, as far as possible, for the class of cases where operation would be advisable, and to this end a letter was sent to a number of eminent specialists in nose and throat diseases in this city, asking them what, in their opinion, were the exact indications for the operative treatment of enlarged tonsils. It was a significant fact that no two of these specialists agreed as to the exact details; most of them dwelt upon many features of this condition which, from the standpoint of the medical inspector, were not practical. The opinions expressed by them revolved about the following points: size of the tonsil, adhesion to the pillars of the fauces, smoothness of the surface or the presence of large and irregular crypts, the embedded tonsil, the pathological tonsil, the tonsil which was subject to frequent attacks of acute inflammation, the susceptibility of children, because of this enlargement, to infectious diseases, and the question as to whether the tonsil was hypertrophic or hyperplastic. There was no unanimity of opinion, nor was any statement made that was practical to apply to the work of medical inspection of school children. In fact, it could readily be gathered from the statements made by them that if a set of one hundred children with enlargement of the tonsils was submitted to these seven specialists, no agreement could be reached between them as to the indications for operation in these cases.

Realizing, then, the marked difference in opinion that must be considered even in the diagnosis of these cases, the Bureau of Child Hygiene established a standard as follows: that no case was to be considered as true hypertrophy of the tonsils unless the hypertrophy was such as to interfere with the nutrition of the child or to cause

secondary disturbances, interfering with its health and, incidentally, with its school progress. In other words, no tonsil was to be considered hypertrophic unless the medical inspector, considering it as his personal case, believed that its presence was a distinct detriment to the health of the child, and that, therefore, the tonsil should be removed. At no time has the medical inspector been allowed to indicate the character of treatment that should be considered advisable. The Department of Health has always taken the attitude in regard to the inspection of school children that its duties consist in ascertaining defects which interfere with the health of the children, calling the attention of the parents to the fact that the children are so affected, and making all possible efforts to see that the children in question are placed under competent medical care. The Department does not feel that it should dictate the character of treatment to be obtained by the child but holds that this is a matter which should be left to the attending physician. It also believes that its functions and efforts should not extend beyond seeing that the parents are made to realize their responsibility in regard to the welfare of their children and that the latter are placed under medical care. For this reason a certificate from a physician or surgeon, stating that a child is under his care, has always been accepted by the department as evidence of treatment, although the department realizes from extensive experience the futility of so-called "medical treatment" in the cure of either enlarged tonsils or adenoids.

Since January 1, 1909, the Bureau of Child Hygiene has kept accurate and careful records of the occurrence of these cases among the school children of this city, and it is interesting to note, that whereas in 1909, 22 per cent of the children in the public schools were found to have hypertrophied tonsils, in 1912 only 10.14 per cent were found to be so affected. The reduction in the number of cases of defective nasal breathing, with possible adenoids, has been even greater, or from 18.7 per cent in 1909 to 7.6 per cent in 1912.

Statements (a) and (b), therefore, as outlined in your report, are founded on a misapprehension, for when it is stated that (a) "tonsillectomy in children should be advised only by those specially trained to recognize the conditions demanding this operation" and (b) "the average school inspector and visiting nurse is incompetent to decide this question" it should be realized that this latter assumption is based upon conditions which do not exist, as the inspectors do not recommend treatment, but simply state that an

abnormal condition is present, and then the matter is referred to the family physician for such action as he may deem advisable.

The first question, "Should the present widespread practice of tonsillectomy in school children be continued, and the school inspectors encouraged in urging parents to have their children's tonsils removed?" seems also to be founded upon a misapprehension. I would call your attention to the fact that, in 1912, out of 287,469 children examined, 30,021 (or 10.4 per cent were found to have hypertrophied tonsils. Of this latter number, 14,137 (or only 47.1 per cent) obtained treatment. The character of this treatment, according to the certificates of the physicians and surgeons who administered it, was as follows: Operations, 6,239 or 20.8 per cent; medical treatment, 7,898 or 26.3 per cent.

Of the total number of children with tonsils so enlarged that the nutrition and well-being of the child were seriously interfered with, only 20 per cent had the tonsils removed. This hardly seems to warrant the idea that there is a widespread operating for partial or complete removal of tonsils.

No attempt is made by the medical inspector to diagnose adenoids. It is not possible, in the ordinary school building, to provide facilities for a proper examination of the naso-pharyngeal vault and therefore, for many years, the department has not used the term "adenoids" in its report of the physical condition of school children, but each child has been tested to determine whether or not its nasal breathing was occluded. In each such case, a diagnosis of defective nasal breathing has been made, and it has been left for the family physician to decide whether or not this occlusion was due to adenoids, deflected septum, hypertrophied turbinate, nasal polypi, or other cause, and to provide appropriate treatment.

The second and third questions of your report, relating to whether or not tonsillectomy on tonsillotomy should be performed in outpatient clinics, are of particular interest to this department because several years ago, our experieence of the results of operating upon these children in dispensaries, and without anesthesia, and sending them home immediately after operation, was such as to lead us to believe that additional hospital facilities must be provided and that, eventually, operations in dispensaries would cease because of their frequently harmful nature. The shock to the nervous system of the child, as a result of having this operation performed without anesthesia, the fact that in many instances the struggles of the child prevents the operation being either a complete or a partial success, the danger of septic sore throat and the more marked dan-

ger of secondary hemorrhage, are results which have been noted by the department's inspectors and nurses in no inconsiderable number of cases. There are, in this city, a large number of people who are unable to pay the fee required for the use of an operating room or the anesthesia, and, possibly, the cost of remaining in a hospital, yet whose children are urgently in need of this operative care. While the Borough of Manhattan is fairly well supplied with hospitals and dispensaries, the other boroughs are not so well cared for and it is often impossible for a school child to go to a dispensary at any great distance, owing to the fact that its parents are frequently unable to accompany it. The Children's Clinics maintained by the Department of Health, therefore, have been placed only in those parts of the city where the need was evident and where the existing facilities were insufficient to care for the number of children needing treatment and unable to pay for it. The greater need, however, which was covered by the establishment of these dispensaries was the provision of a place where a child might be adequately cared for during its operation.

Before sending a child to one of these clinics, the nurse investigates the financial status of the family, and children are not referred for treatment unless the family is unable either to pay a private physician or the requisite fee for hospital care. After a child is received at the clinic, a further investigation as to the financial status of the family is made by the registrar. The clinics are operated under the control of the State Board of Charities, and the department makes every possible effort to see that the facilities are extended only to those children whose parents are unable to pay any fee.

In our clinics all children are received the afternoon before the day of operation; they are kept there that night, regularly prepared for operation, and the following morning the adenoids or tonsils are removed under gas and ether anesthesia. The child is then kept in bed during that day, remains in bed the following night, and is finally discharged thirty-six or forty-eight hours after entrance. Nearly four thousand such operations have been performed since the dispensaries were opened, with one fatality. This latter was the case of a girl, 11 years old, who was mentally defective. She was operated upon at 10 o'clock in the morning, about two hours later became cyanotic, reacted well to stimulation, and showed improvement until about 3 o'clock in the afternoon, when she again became cyanotic, developed an exceedingly rapid pulse, and died suddenly. There was hemorrhage from the throat just before

death. In every other instance the child has left the hospital in good condition and has remained so.

From our experience with these children, we believe that these operations should never be performed except under anesthesia and that, in each case, the child should remain in the hospital for twenty-four hours after the operation has been performed.

In order that the school children of this city may receive the care to which they are entitled so that they may reach normal development in adult life, it is essential that everyone connected with this problem should realize the necessity of harmonious and co-operative work. In the care of school children there are many factors involved: first, the Board of Education, which has charge of the school buildings and the conditions under which the children study; second, the Department of Health which has charge of the school medical inspection and examination; third, the medical profession, who must make the ultimate diagnoses and provide for treatment; fourth, the parents, who must be convinced of the necessity of proper care for the child, and, last and most important of all, the child himself, towards whom our efforts are directed. Unless there is complete understanding, unless there is a realization of definite good to be done, we shall all fail of our purpose, but if each will do his part, with a realization that there is a part for each to do, the status of the school child, as far as its physical condition is concerned will be inevitably and materially improved.

33 West Ninety-sixth Street.

Treatment of Diphtheria and Diphtheria Carriers. SOLON G. WILSON, *New Orleans Med. and Surg. Jour.*, Sept., 1913.

The best results in the treatment of the disease is by large doses of concentrated antitoxin, 10,000 units being the initial dose, given intra-mascularly, with a period of twenty-four hours between the doses, the membrane being the chief guide of repeating the dose, except, of course, in the laryngeal type, and in this type the stenosis and cyanosis serving as a guide. Owing to the frequency of diphtheria carriers, cultures are advised before tonsillectomies and adenectomies. SCHEPPEGRELL.

CASE REPORTS.

Dr. W. D. Black, St. Louis.

Case 1. Hemoglobinuria following peri-tonsillar abscess and recurring after other infections: In 1905, I was called to attend a patient, male, 12 years of age, apparently healthy. He had had most of the infectious diseases of childhood with the exception of scarlet fever. The child's tonsils and adenoids were operated upon three years previous to the present illness but were only partly removed. Present illness began with a sore throat, chills and fever. About twenty-four hours after onset the tonsils showed a typical follicular tonsillitis; after two or three days the follicles disappeared but the right tonsil began to get painful and swollen. In two or three days the patient had a well-developed peri-tonsillar abscess which was opened the sixth day and pus evacuated. About this time the patient showed signs of sepsis. Urine showed a change, dark amber at first and after twenty-four hours reddish-brown, was slightly decreased in quantity. After rest and eliminative treatment the urine gradually cleared, in about two weeks. Examination of the urine by two microscopists showed a quantity of albumen hyaline and granular casts; the latter disappeared after a few days. Another microscopist reported hemoglobin but no red blood cells. After two years of treatment by diet and change to a southern climate the patient's urine became free of albumen and he fully recovered.

In 1908, three years after the first attack, the patient again had an infection simulating grip. Although there was only a mild pharyngitis and tonsillitis the urine again showed a change in color after twenty-six hours. Examination of urine chemically showed albumen and casts which latter disappeared after seven or ten days. The pathologist who reported the finding of hemoglobin during his first illness reported a similar condition in this attack. Two other doctors examined the urine and confirmed his findings. This attack ran a course similar to the first one, requiring many months before the urine showed no trace of albumen.

During the next five years the patient was in good health except for frequent colds which produced a small amount of albumen in the urine but no casts or hemoglobin and which disappeared after a week or two.

In February or March, 1913, he again had an attack which came on a little different from the others. In this attack the first symptoms were dryness of the throat with dysphagia but no tonsillitis. Buccal membrane and that of pharynx showed a pale, red color; tongue dry and rough. Urine findings identical to those of prior attacks. This attack was severe and the patient showed much prostration and headache which were relieved by eliminative treatment. Although this attack was severe the urine cleared much more quickly and the patient was fully recovered in a few weeks.

In January, 1914, the patient developed typical follicular tonsillitis followed by peri-tonsillar abscess. Pus was evacuated eight days after the onset of the peri-tonsillar infection. Again the urine showed hemoglobin, albumen and a few casts. After a couple of weeks the patient is again apparently normal.

All attacks practically ran the same course and in all probability came from the throat infection. One particular striking symptom noted during each attack was the slight icterus and slowing of pulse rate which ranged between fifty and sixty per minute. There was no edema or any general symptoms that often accompanies acute nephritis. The blood was examined for plasmodia each time and none found. A Wassermann test of patient's blood was not made.

Recently W. W. Young, of Boston, wrote an article which appeared in Vol. XLII, No. 5, of the *Journal A. M. A.*, in which he quotes Cook who states that 90 per cent of hemoglobinuria gives a positive Wassermann reaction. Now in this case I am positive the attack followed throat infection.

The father of the patient had two attacks of iritis three or four years prior to a tubercular involvement of the lungs but no history of lues. The iritis was diagnosed rheumatic by a competent oculist.

I have repeatedly advised the complete removal of the tonsils and adenoids but the mother of the patient will not consent.

Case 2: Luxation of the faucial tonsil: Patient, Russian who could not speak English, aged 44 years, came to City Hospital clinic, suffering from a sore throat.

An examination revealed an acute tonsillitis and pharyngitis. The left tonsil was spherical and was lying in a cup-shaped cavity. This cavity was supported by a short, thick column of fibrous and lymphoid tissue at the inferior tonsillar fossa, filling it about one-third of its height. Upon using a probe, I discovered it was attached by a sort of pedicle and the tonsil could be pushed forward over the cup-like receptacle into the oral cavity for about half an

inch. The patient informed the interpreter that this accident often happened and caused him much discomfort. The condition was probably congenital and I recommended the removal of the tonsil. The patient did not return.

Case 3. Gunshot wound in mastoid: Patient, a boy about 15 years old, played with a revolver, (22 caliber) which was accidentally discharged. The bullet entered the mastoid about the middle and ranged inward and upward toward the antrum. Infection occurred and when I saw him at the City Hospital clinic he gave a history of a discharge from the ear since the accident, which was several months previous.

A radiogram disclosed that the bullet split, one fragment lodged in the region of the antrum and several small pieces in the mastoid and posterior wall of the canal. I performed a radical mastoid, and the patient was discharged from the hospital in a few weeks, cured.

Case 4. Purpura hemorrhagica: Girl, aged 7 years; American; good home surroundings; looks well nourished but a little pale; teeth normal, had tonsils operated by a surgeon four years ago. About three-fourths of right tonsil was removed and about one-half of left. Father brought child to see me owing to slight hemorrhage from the throat and for removal of tonsil. Found on examination that the gums were normal. Buccal membrane on right side showed two or three ecchymotic areas which had the appearance of small scratches, purple and pale red. On examining the right tonsil I found it in fairly healthy condition. Left tonsil large and looked as if it had never been operated. The entire tonsil was covered by a pale, purplish-red area but no free hemorrhage. On the posterior lateral wall of the pharynx there were about six ecchymotic areas similar to those on the buccal membrane. There was no history of any of the exanthematous diseases.

Next examined skin of leg and on each thigh found areas of purplish reddish spots about the size of a No. 1 shot.

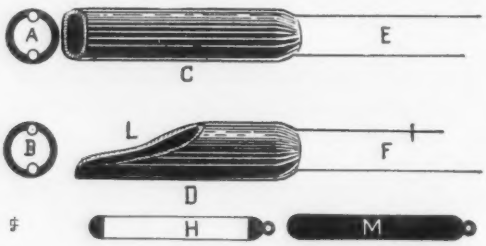
Diagnosis made of purpura and referred to internist. Father afterwards told me another ear, nose and throat surgeon advised removal of tonsil after a hasty examination. The father did not tell him of my diagnosis and of course did not consent, knowing what the outcome would be. The patient was treated by two internists and in about two weeks after I saw her she began to bleed, first from the bladder and then from under the skin, and finally died after two or three weeks.

Metropolitan Building.

ESOPHAGOSCOPIC RADIUM SCREENS.

Dr. Chevalier Jackson, Pittsburgh.

The curative effect of radium in cancer is not yet sufficiently demonstrated to warrant its use in an operable case. But in the inoperable cases of esophageal cancer the results are so encouraging that further testing is justifiable. Efficient screening and large dosage are two essentials. The author has had such excellent satisfaction with a screen of hard rubber vulcanized on the end of the esophagoscope and on the capsule container as shown in the illustration that it is here published in the hope that it may aid others. With this combination any desired screening can be obtained and



the irritating secondary ray developed on emergence from metal, can be practically entirely cut off, enabling the use of large dosage. With accurate placing under guidance of the eye, burning of healthy tissue can thus be avoided. The hard rubber screen can be vulcanized on the end of any form of esophagoscope by any first-class instrument-maker. Being vulcanized to the metal it cannot be accidentally detached. (Figure 1). A covering of hard rubber, C, is vulcanized on to the metal end of the esophagoscope, E. At L, is shown a special form of end arranged with an open side. A and B shows cross-sections of these tubes. M illustrates a capsule entirely covered with hard rubber and at H is a capsule whose ends only are covered.

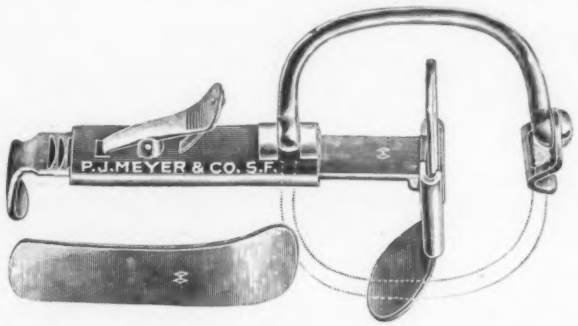
Westinghouse Building.

AN IMPROVED MOUTH-GAG.

Dr. A. S. Green and Dr. L. D. Green, San Francisco.

The mouth-gag devised years ago by Sewall has been a great aid in tonsil operations. It at once acts as a mouth-gag and tongue-depressor and gives a good exposure of the field of operation. Its failure to give universal satisfaction is probably due more to its improper use than to any great fault of the instrument itself.

If the blade is too short it will cause buckling of the tongue; if too long it may touch the epiglottis; in either event it may cause gagging or shut-off respiration. Care must be used to adjust the blade just long enough to fit over the base of the tongue, to raise the



handle to the fullest extent and to maintain it in this position throughout the operation. This raises the mandible and permits free respiration.

There are, however, legitimate faults inherent in the instrument and in no way due to faulty manipulation. These objections we have eliminated in the instrument shown in the accompanying illustration.

By substituting a sleeve to hold the tongue-blade for the screw-device of the Sewall gag, we eliminate an inch or more of metal from projecting into the field of operation. This field is further enlarged by doing away with the rigid cross-bars and utilizing a half arm which can be swung to either side as necessary without removing the gag from the mouth. The upper teeth are held in a V-shaped lead trough, which swings on a pivot. This arrangement avoids breaking the teeth and its adaptibility helps to maintain the gag in the proper position.

With this instrument many operations can be done that are difficult to do with the older instrument, as for instance the Sluder operation, and the removal of adenoids. Ligating bleeding-points in the tonsillar fossae becomes easy because it allows a perfect view, so that the vessel can be caught with forceps and the ligature carried down over it without interference from cross-bars at the angle of the mouth.

Shreve Building.

GOOD RESULTS FROM USE OF NORMAL HORSE SERUM IN A CASE OF HEMORRHAGE FROM A RUPTURED ESOPHAGEAL VEIN.

Dr. Edwin Cobb, Marshalltown, Iowa.

Mr. A., age 38 years, farmer, Eldora, Iowa, was referred to me by Dr. Koeneman, July 7, 1913. For the last two weeks patient had a very troublesome cough, and yesterday blood was expectorated in amounts varying at times. Patient was brought to this city and placed in the hospital for absolute rest. Examination by both direct and indirect methods revealed a distinct oozing from region of the posterior wall of the esophagus. General examination, negative, especially lungs, and no tendency toward passive congestion. Patient was very anemic, with a distinct pallor present.

In spite of the ordinary measures taken for relief, such as ice bag, absolute rest, calcium chlorid and codein for cough, the oozing continued. Ten ccm. of normal horse serum was administered hypodermatically. Twelve hours later, 10 ccm. more was given in the same manner. The following morning the hemorrhage was much lessened. Two days later it was completely absent.

Patient was kept in the hospital for one week and then allowed to go home. Two weeks later patient returned stating that he had expectorated a little blood-tinged mucus. Twenty ccm. of the normal horse serum was administered in separate doses with absolute cessation of oozing and at the end of three days patient was discharged and placed under care of general physician. Two months later patient was seen and had gained thirteen pounds; general condition much improved, especially in regard to red cells, with no return of the hemorrhage in any form.

Later, I had occasion to do a nasal operation on a brother; the hemorrhage was far beyond the ordinary. There was evidently a hemophilic tendency in the family.

312 Masonic Temple.

A NEW MODIFICATION OF AN OLD ADENOTOME.

DR. A. C. HEATH, St. Paul.

The one drawback to all forms of adenoid curettes or adenotomes is that the adenoid mass is difficult to engage, as it often rolls under the cutting blade and much of it is missed. To overcome this difficulty I have added to the La Force adenotome, a double tenaculum forceps, each blade of the tenaculum shaped to follow the line of the vault and posterior wall of naso-pharynx; this tenaculum

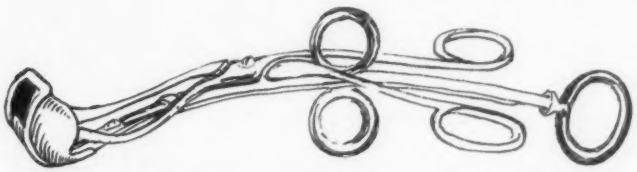


Figure 1: La Farce adenotome with handles of tenaculum forceps at right angles to adenotome.

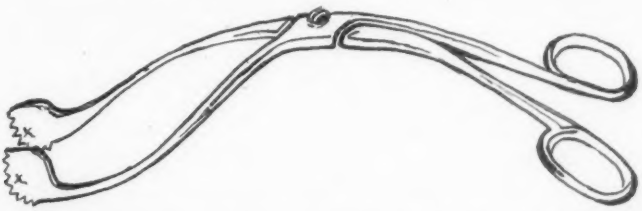


Figure 2: Tenaculum forceps separately with teeth (x) to grasp adenoid mass.

is situated within the box, so to speak, of the La Force adenotome.

This tenaculum forceps when closed grasps the adenoid mass laterally from either side along its entire length, pulling it down and pressing it to the center of naso-pharynx; then the knife is pushed through the adenoid as it is thus firmly held. The adenoid is taken out very completely in this way and with very little difficulty.

Lowry Building.

SOCIETY PROCEEDINGS.

PHILADELPHIA LARYNGOLOGICAL SOCIETY.

DR. ROSS HALL SKILLERN, CHAIRMAN.

Regular Meeting, April 15, 1913.

The Naso-pharynx as a Cause of Disease in Other Parts of the Body. JUDSON DALAND.

The striking clinical picture produced by adenoids in children, i. e., the peculiar dull facial expression, the open mouth, the short upper lip, the enlarged and full red lower lip, the occasional dribbling of saliva, associated with diminished intelligence, the existence of mal-nutrition as evidenced by diminished growth, weakness, anemia and loss of weight, abundantly demonstrate the influence of naso-pharyngeal disease upon the bodily health. Conversely, when the adenoids are removed, the comparatively rapid disappearance of all these phenomena and the truly remarkable increase in growth, corroborate this statement. Nasal stenosis, from the internist's standpoint, may be viewed as complete or partial or intermittent, and causes varying degrees of mouth breathing. Nasal breathing regulates the temperature and humidity of the inspired air and also removes foreign particles, such as dust for example; therefore the mouth-breather loses this advantage. In consequence of mouth-breathing, catarrhal inflammation of the mucous membranes of the mouth, pharynx, larynx and tracheo-bronchial tubes are frequent, and when the inspired air requires moisture, it is secured from the mucous membranes of the respiratory tract, mouth and pharynx. In like manner dust and irritating particles frequently enter the bronchial tubes giving an added cause of irritation. The inspired air, which is prevented from traversing the nasal chambers in nasal stenosis and therefore passes directly through the mouth into the bronchial tubes, may be viewed as unprepared for entrance into the lungs and the delicate mucosa is irritated; and I incline to the opinion that spasm of many of the finer bronchioles is induced; thus shutting off air from many alveoli which remain more or less constantly in a collapsed or semi-collapsed state. Physical examination of the lungs clearly demonstrates that breathing through the mouth produces a vesicular murmur harsher than normal, and that inspiration and expiration are more nearly of the same length; whereas in normal nasal breathing the entire act of inspiration murmur is much longer than the expiratory murmur, and the quality of the vesicular murmur becomes soft and breezy and characteristic of normal pulmonary breathing. Auscultation, therefore, corroborates the theory that in mouth breathing the air is prevented from penetrating freely and easily into all parts of the lung, and does not enter many alveoli, and therefore the resultant inspiratory murmur becomes harsher and possesses less of the vesicular element than normal. If a

comparison is made of the vesicular murmur produced by normal nasal breathing with that of mouth breathing, the difference described is readily recognized.

Nasal stenosis, by causing insufficient pulmonary expansion, induces corresponding alterations in the chest; the ribs become more oblique, the vertical diameter increases, the transverse diameter decreases, the inferior costal angle become more acute; thus predisposing to disease, more especially tuberculosis, and as has already been stated, the air inspired by a mouth-breather induces tracheo-bronchitis, laryngitis and also spasmodic croup and asthma. As many alveoli are habitually collapsed or only partially filled with air with each inspiration, only partial oxygenation and decarbonization is possible. Naturally, this interferes with metabolism and consequently with growth. Anemia is commonly observed, usually of a moderate grade, and, as a rule, the loss of hemoglobin is greater than the loss of erythrocytes, constituting chloro-anemia.

As the diminution in hemoglobin is due in part to a deficient supply of oxygen, this form of anemia is rarely influenced by ordinary remedies; but when nasal obstruction is removed and the patient again forms the habit of breathing normally the blood recovers its physiologic balance. Any interference with oxygenation and decarbonization of the blood acts deleteriously upon the individual cells of the body and produces an alteration in metabolism, and in all probability chemical bodies form, circulate in the blood, and may be more or less toxic.

Nasal stenosis in the young produces morphological changes in the mouth; the dental arches become narrow and, in consequence, the teeth show want of alignment, are crowded and displaced and occlusion becomes imperfect, thus markedly interfering with mastication, which in turn leads to disorders of digestion. Under these circumstances the palatine arch is high and encroaches upon the nasal spaces and the voice is more or less altered. In permanent and complete nasal obstruction the sense of partial suffocation, shortness of breath and asthmatic attacks may occur. When pressure is exerted upon the septum asthma may be induced.

Intermittent, complete or partial nasal obstruction is frequently due to relaxed and enlarged turbinal bodies, due to venous stasis, which in turn is commonly due to excessive fatigue or nervous exhaustion, and may occur from shock. It may be diurnal but is more apt to be nocturnal, and usually causes complete obstruction of the pendant nostril. Upon turning the head this condition is frequently reversed. Not infrequently nocturnal mouth breathing is thus induced, usually associated with snoring, frequently causing insufficient oxygenation so that the individual awakens in the morning after sleep feeling unrefreshed.

Partial nasal obstruction is frequently overlooked and may sometimes be caused by a very small adenoid obstructing one of the posterior nasal orifices. Spasmodic croup in children is often caused by dryness of the laryngeal and pharyngeal mucous membrane, which is often relieved when water is taken at short intervals.

The usual infective organisms of the naso-pharyngeal tract are: Influenza, streptococci, staphylococci, pnemococci and diphtheritic and syphilitic infection, and may be loated in the tonsils, nasal passages or the

sinuses including the mastoid. These infections may be acute or chronic, and may be limited to one or more of the tonsils or one or more of the sinuses, and may remain local or extend to adjacent structures or become constitutional. In certain cases that may be called carriers, some of these micro-organisms may be constantly present in the nose, sinuses or pharynx and the individual be apparently healthy. Such persons may innocently spread diseases, such as influenza or diphtheria. It is now well established that when leprosy invades the nose it may be transmitted by nasal discharges. An apparently normal naso-pharynx may contain active pathogenic organisms. Frequently recurring attacks of influenza may be really acute exacerbations of chronic influenzal inflammation of the nasal passages or sinuses.

Headaches, mild or severe, recurrent or constant, may be due to frontal sinusitis; and when the exit is obstructed and the secretions retained, the pain may become agonizing. In sphenoidal sinusitis the orbit contents may be involved by extension of inflammation and ocular disturbances may be induced reflexly. Meningitis, by extension, may be caused by suppurative inflammation of the sphenoidal, ethmoidal or mastoid cells and in the latter a septic thrombus may also occur. Suppuration of the superior maxillary sinus may be the underlying cause of facial neuralgia.

Mild or severe septicemia or pyemia, which at times may be recurrent, may be evoked by a streptococcus sinusitis, tonsillitis or pharyngitis. Ostitis, periostitis, arthritis, periarthritis, and arthritis deformans have been traced to a septicemia, laryngeal or nasal in origin; and a similar origin may be ascribed to certain cases of anemia and pernicious anemia. It is now generally believed that general pneumococcus infection, accompanied by lobar pneumonia, may arise from a local pneumacoccic infection of the mouth, pharynx or nose.

Many cases of septic polyarthritis are incorrectly diagnosed as acute or chronic rheumatism. Although the origin of the sepsis may be in any part of the body, it is most commonly situated at the root of the teeth, the tonsils or in the nose or sinuses. Unless the septic nature of the arthritis is recognized and the focus discovered, recurrences are common. The following case illustrates the common error of mistaking acute septic polyarthritis for rheumatism:

Case 1: Female, aged 18 years, stated that nine years ago she had severe tonsillitis, followed by so-called acute polyarticular rheumatism involving the joints of the left upper and lower extremities and the right wrist, with fever and delirium. During convalescence which occurred three months later, observed marked weakness, dyspnea on exertion, tachycardia and cardiac palpitation; and examination of the heart showed marked mitral stenosis. When first seen six years later she complained of recurring attacks of sore throat and rheumatism of the throat, neck and shoulders and so-called rheumatic pains in various parts of the body. The tonsils were much enlarged. These symptoms persisted. The tonsils which were removed one year later by Dr. Walter J. Freeman, were small, and showed in each, decomposing cheesy material and an abscess cyst of the left tonsil. Since then there has been no return of the so-called rheumatism or cardiac symptoms. Cardiac compensation is so com-

plete that a game of tennis produces no symptoms of cardiac insufficiency. It is evident that the septic focus in the tonsils was the cause of acute polyarthritis and mitral valvulitis.

Case 2: A boy, aged 16 years, suddenly became blind in the right eye. Dr. L. Webster Fox diagnosed embolism of the retinal artery. The patient gave a history of so-called polyarticular rheumatism. Examination of the heart revealed the usual signs of mitral valvulitis. Sepsis was suspected, and although no focus could be detected anywhere, and the patient denied nasal symptoms, examination by Dr. Ross H. Skillern revealed suppurative ethmoidal sinusitis, which was drained. The patient has not returned for re-examination; nevertheless, it is probable that he has escaped recurrence of acute septic arthritis and endocarditis.

That mild septicemia may produce moderate anemia is well recognized; but that pernicious anemia may be so induced is not generally known. In a male, aged 62 years, presenting the complete clinical picture of pernicious anemia, examination of the blood showed that the hemoglobin was 25 per cent, the red blood cells 1,180,000 or 22 per cent and there were present many microcytes, many macrocytes, poikilocytes and occasional megaloblasts, leucocytes 2,200 per cmm. Dr. George M. Hughes and Dr. J. W. Kennedy drained a suppurative tendo-sinivitis and recovery followed.

DISCUSSION.

Dr. C. F. Adams: The accessory cavities of the nose, namely the maxillary sinus, the frontal sinus, ethmoid cells and sphenoid sinus may implicate in their disease the orbit and the optic nerve. This is most apt to occur in diseases emanating from the ethmoid cells, for the latter are separated from the orbit only by the thin lamina papyracea, which, moreover, sometimes has gaps in it.

The most posterior ethmoid cell not infrequently extends into the small wing of the sphenoid and then comes into closer relation with the optic nerve because it now borders on the optic canal, and it may extend so far beyond the median line that it actually adjoins the optic canal on the other side. Otherwise, the wall of the optic canal is formed in part by the sphenoid sinus.

In the optic canal the dural sheath of the optic nerve is transformed into the periosteum of the bony canal. The optic nerve, therefore in this situation is enveloped only by the delicate pial sheath which in most places is attached to the periosteum and on the upper side is actually adherent to it. The first branch of the trigeminus runs through the cavernous sinus and in this part of its course lies close to the lateral surface of the body of the sphenoid. This is the reason why it is may react under the form of neuralgias to an inflammation of the mucous membranes of the sphenoid sinus as is shown by the following case: C. R. V., age 36 years, driver of a delivery wagon, in whom two years ago a facial neuralgia began on the right side, worse over the eye, growing worse for the past two weeks. Vision normal. Septum deviated to the right to such an extent that the cavity could not be explored. Slight post-nasal discharge. With iodin applications to the nares and insufflation of cocain and bismuth his neuralgia was immediately relieved and eventually cured.

Axenfeld states that in cases of orbital cellulitis, in which the examination is negative, the original sinusitis which occasoned the obital condition is progressing on account of the absence of drainage. Reports of such cases are numerous.

These cases show that there is a close relation between the lymph and blood supplies of the naso-pharynx and the eyes, and the exciting cause is adenoids. I claim that adenoids by interfering with the nasal circulation and causing catarrh, at the same time also interfere with the circulation of the eyes producing a hyperemia and a disturbance of the choroidal pigment, which may be readily discerned with the opthalmoscope, and when adenoids are removed in children before too much damage has been affected the eye will return to normal and the amblyopia will in a few weeks disappear.

DR. THOMAS H. FENTON: The work of the rhinologist contributes enormously to the general welfare. We are broadened by Dr. Daland's description of conditions following disturbances in this region, for instance, arthritis, which might be regarded as due to other causes. We have heard from Dr. Daland how the general health may become affected, temporarily or permanently, a result of disease of the sinuses, tonsils or adenoids. We note the local manifestations, turgescence, digestive disturbances, and lithemia. The blocking of the sinuses affords a resting place for germs.

A young woman, facial expression of pain for past three weeks, was victim of extraordinary bullar, ocular and supra-orbital pain. Atropin had been applied, failing of relief sought other advisers. Found no obstructive or inflammatory changes; optically perfect. The case was referred to Dr. Randall, who found blocking of one of the outlets,—passing of a probe and releasing the secretion gave immediate relief.

From the standpoint of the opthalmologist, I cannot say that the data in reference to sinus disease is as clear as we should like to have it. The classification seems to be very much at fault.

DR. WM. EGBERT ROBERTSON: I regret that I did not have the privilege of hearing Dr. Daland's contribution in its entirety. The subjects which he has discussed are of very great importance as they have a bearing, not only upon the work of the specialist, but even more particularly upon the work of the general physician, who is often, usually, the first physician to be consulted by the patient. Curiously, however, not only the family doctor fails at times to recognize sinus and nasopharyngeal disease as the primary focus of a general infection or of a local infection or reflex, but even the specialist may not discover it. I recall two interesting cases at this moment—one of them had recurring attacks of iritis with hypopyon first in one eye then the other, and was referred by the rhinologist to an opthalmologist and later to me. Transillumination, as is so often the case, failed in this instance to reveal the disease. She had very large middle turbinates which interfered with drainage, and I suspected not a purulent condition but rather the presence of old granulation tissue in the sinuses particularly the ethmoid. An x-ray made by Dr. Pfahler confirmed this, and I have since been able to prove the correctness of the view by having the ethmoid cells cleaned out after snaring off the middle turbinate.

(To be continued.)